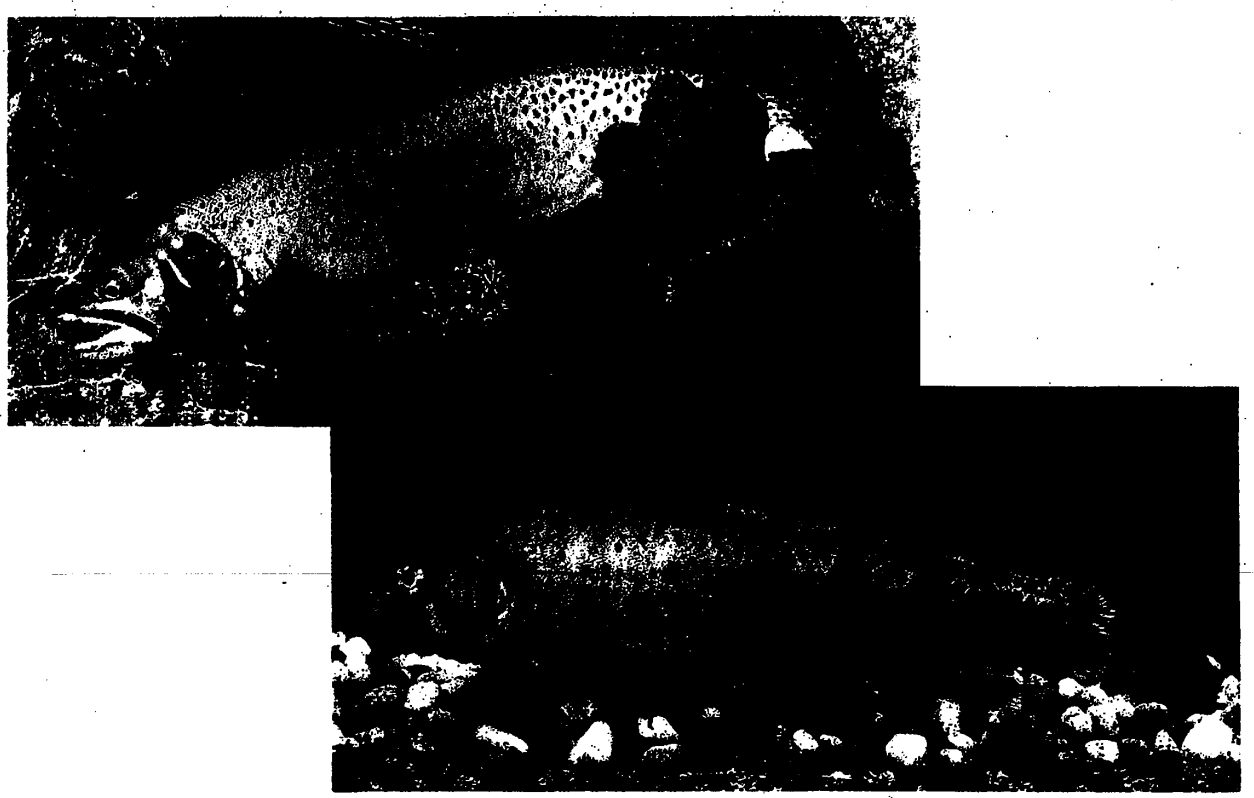
Abundance of Bonneville Cutthroat Trout In Southern Utah, 2001-2002, Compared to Previous Surveys



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Publication Number 03-18

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Director

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INTRODUCTION

Bonneville cutthroat trout ***(Oncorhynchusclarki utah)*** are the only native sport fish found in southwestern Utah's Bonneville basin. As with other subspecies of cutthroat trout throughout the intermountain west, habitat alterations and introductions of nonnative trout from the late 1800s until the 1970s caused large scale losses of this native fish. Active management of Bonneville cutthroat trout began in southern Utah (Hepworth et al. 2002) after the Endangered Species Act was passed in 1973. By the 1990s, interagency management to conserve, protect, and expand populations of Bonneville cutthroat trout led to the development of a formal management strategy for the state of Utah (Lentsch et al. 1997). Part of the interagency management strategy included monitoring native cutthroat trout populations to assess their current status and give direction to management actions. All known populations of Bonneville cutthroat trout in the Sevier, Beaver, and Virgin river drainages of southern Utah were surveyed in 1994-1995 (Hepworth et al. 1997a) and then scheduled to be re-surveyed in 2001-2002.

This report presents results of the 2001-2002 surveys of Bonneville cutthroat trout in southern Utah. Results are compared to the 1994-1995 surveys and to conditions in 1977 when formal management of Bonneville cutthroat trout began.

STUDY AREA

The Sevier and Beaver rivers drain desert basins within the Great Basin, ending in the Sevier Lake (Figure 1). Most of the main stem of the Sevier River and the lower Beaver River were once inundated by prehistoric Lake Bonneville. Only the mountainous tributaries were higher elevation than the ancient lake. After the dessication of the lake, about 8,000 years ago, cutthroat trout persisted in suitable cold water habitats, We surveyed areas where remnant

populations of cutthroat trout were known to occur and where populations have been restored.

In addition, we surveyed populations of Bonneville cutthroat trout in the Virgin River drainage (Figure 1). Although the Virgin River drainage is outside the Bonneville Basin and flows into the Colorado River, two populations of Bonneville cutthroat trout were identified from this area in the 1970s (Behnke 1976). It was later determined that these populations were likely native to the headwaters of the Santa Clara River (a tributary to the Virgin River), as a result of a stream capture event (Hepworth et al. 1997b). Lava flows likely redirected a headwater tributary from the Great Basin to the Santa Clara River sometime after the dessication of Lake Bonneville. In addition, we surveyed other streams within the Virgin River drainage that had been restored with Bonneville cutthroat trout.

METHODS

All known populations of Bonneville cutthroat trout were sampled during 2001-2002 using a backpack electro-fishing unit. Surveys were conducted when stream conditions allowed effective sampling. A minimum of two 100-m sites were electro-fished on each second or higher-order stream, and at least one 100-m site was surveyed on first order tributaries. Population estimates were made using a 2-pass removal method (Zippin 1958). We attempted to collect all cutthroat trout except young-of-the-year less than 50 mm total length (TL). Total length and weight (g) were measured for all trout collected in samples.

Mean wetted stream width was determined by taking measurements at 10 random transects within each survey site. Stream dimensions were combined with population estimates and mean &outweigh& to estimate trout biomass by stream length (km) and area (ha).

We also electro-fished outside designated survey sites to determine upstream and

downstream range of cutthroat trout in each stream surveyed. Range locations and stream distances were determined with a global positioning system (GPS) unit and U.S. Geological Survey topographical maps. Reaches currently inhabited by Bonneville cutthroat trout were classified as occupied habitat. Some reaches found occupied during previous surveys but presently unoccupied and reaches that had not yet been colonized were classified as unoccupied habitat based on our judgement. Trout abundance and distribution were compared to previous surveys. Trends were classified as increasing, decreasing, or stable, depending if current values differed more than 10 % from previous surveys.

RESULTS

Survey results were compiled by stream with maps showing the distribution of native trout and tables listing their abundance and biomass at specific sites (Appendix A). With the exception of some rainbow trout hybridization in the North Fork North Creek, Bonneville cutthroat was the only species of trout found in these areas. The one exception of hybridization was <10% as determined by genetic analyses, allowing the population to be designated as a "conservation population" according to state standards (Utah Division of Wildlife Resources 2000; Hepworth et al. 2002).

Comparisons of current results with previous surveys showed generally increasing trends in both occupied stream distances and trout biomass (Table 1). Formal surveys of Tenmile Creek (VIAA440) and Birch Creek (VIAA550) were not conducted or included in the Appendix because native trout had just been restored in these streams, but these streams were noted as part of increasing trends. Fish densities and biomass generally increased because recently restored populations were still expanding after the 1994-95 surveys. Decreasing trends occurred at a few

streams largely because of the recent drought. In one situation drought conditions crowded a trout population into unusually limited habitat (Reservoir Canyon Creek, Table 1) resulting in an exceptionally high estimate of biomass.

Occupied stream habitat increased in southern Utah from only 10.1 km in 1977 to 56.0 km in 1994-1995, and to 119.1 km by 2002, pre-fire conditions (Table 2). Although surveys were not conducted after several wild fires occurred during the summer of 2002, potential losses could have occurred in as much as 25.2 km of stream, mostly in the Virgin River drainage. Even if wild fires caused complete native trout losses in all areas where they occurred, overall occupied stream length still increased since 1994-1995. Some of the increase (14%) can be attributed to the discovery of additional remnant populations of native trout, but most of the increase was due to the restoration of new conservation populations through stream renovation and transplant projects (86%).

DISCUSSION

Conservation plans included the replication of core populations (generally pure genetic stock with less than 1% introgression) in at least three additional streams (Lentsch et al. 1997; Utah Division of Wildlife Resources 2000). Native trout populations from Birch Creek, Water Canyon, and Reservoir Canyon were all replicated in at least three additional areas. Similar work on the Deep Creek population is in progress. Population replication was considered important to protect local stocks of native trout and insure that unique gene pools would be protected in the event of catastrophic losses at individual sites. This proved to be an important conservation action.

Wildfires in southern Utah during summer of 2002 caused some losses of Bonneville

cutthroat trout. Although most losses from fires occurred after monitoring surveys for this report had been completed, it was apparent that some habitat damage occurred. Following a wildfire, emergency actions were taken to remove all surviving native trout in Deep Creek and transplant them to Tenmile Creek. Transplants were made before the Deep Creek population was completely lost – as a result of ash laden runoff fiom rain storms. Fortunately, Tenrnile Creek had recently been renovated and was already scheduled to receive fish from this source. In addition, fish from Deep Creek had been moved during 1999 to the Left Fork Sanford Creek and Sandy Creek. Also, wildfires killed fish in Leap Creek, South Ash Creek, and tributaries. The extent of fish losses in these streams were not fully evaluated during 2002.

Wildfires impacted neighboring streams in both the Deep Creek fire and the South Ash-Leap Creek fire, showing that a single catastrophic event could extirpate an entire fish stock if replications are limited to adjacent streams. Where appropriate, replications should be made throughout wider geographic areas, while avoiding inter-basin transplants or mixing with other stocks.

Localized fish losses were unfortunate, but more importantly gene pools of native cutthroat trout from southern Utah were preserved, negating long-term impacts. Remnant populations were replicated in enough locations that populations lost from at any single site can be replaced with fish from the same gene pool. Losses will be evaluated during 2003, and streams will be restocked as soon as they are suitable to receive and hold trout. Individual reports will be prepared for specific projects and sites. In addition, the long-term impact of fires and recovery of these populations will be measured by standard monitoring surveys scheduled for 2008-2009.

This survey showed that planned conservation efforts for Bonneville cutthroat trout

resulted in increased overall abundance, positive gains in numbers of populations, a means to recover from stochastic losses, and preservation of local genetic stocks despite localized catastrophic losses.

ACKNOWLEDGMENTS

This program received Federal financial assistance from the U.S. Fish and Wildlife Service. Under Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1975, Title IX of the Education Amendments of 1972, the U.S. Department of Interior and its bureaus prohibit discrimination on the basis of race, color, national origin, age, disability or sex (in education programs). If you believe that you have been discriminated against in any program, activity or facility, or if you desire further information pleas write to:

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Arlington , VA 22203

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Table 1. Current population status (2001-2002) of **Bonneville** cutthroat trout in Southern Utah by individual stream compared to previous conditions (trends noted as an increase or decrease if values changed more than 10%; **>0** indicates small numbers of trout present but biomass or range not measured).

State water identification number (Drainage)	Stream/tributary (indentation denotes tributaries)	Year	Occupied habitat km	Occupied habitat Trend	Biomass kg per ha	Biomass Trend	Comments
VIAA510001 (Sevier)	Deep Creek	1977	–	–	–	–	Genetics not evaluated
		1995	9.7	Increase	49	Increase	Remnant population
		2002a	2.6	Decrease	69	Increase	Impacted by fire
		2002b	0	Decrease	0	.Decrease	Temporary loss due to fire
VIAA360A (Sevier)	Sam Stowe Creek	1977	>0	–	>0	–	Recent transplant
		1995	0	Decrease	0	Decrease	Hybrids found
		2002	4.7	Increase	52	Increase	Restored in 1995
VIAA680 (Sevier)	Threemile Creek	1977	0	–	0	–	Nonnative trout present
		1994	>0	Increase	>0	Increase	Restored in 1994
		2001	11.3	Increase	45	Increase	Population expansion
VIAA680A (Sevier)	Delong Creek	1977	0	–	0	–	Nonnative trout present
		1994	>0	Increase	>0	Increase	Restored in 1994
		2001	5.3	Increase	143	Increase	Population expansion
VIAA680A01 (Sevier)	Indian Hollow	1977	0	–	0	–	Nonnative trout present
		1994	>0	Increase	>0	Increase	Restored in 1994
		2001	1.4	Increase	66	Increase	Population expansion
VIAA430 (Sevier)	Manning Creek	1977	0	–	0	–	Nonnative trout present
		1995	0	–	0	–	Restoration in progress
		2001	17.2	Increase	69	Increase	Population expansion
VIAA430C (Sevier)	E Fk Manning	1977	0	–	0	–	Nonnative trout present
		1995	0	–	0	–	Restoration in progress
		2001	1.0	Increase	15	Increase	Population expansion
VIAA430D (Sevier)	Barney Outlet	1977	0	–	0	–	Nonnative trout present
		1995	0	–	0	–	Restoration in progress
		2001	1.1	Increase	6	Increase	Population expansion
VIAA430B (Sevier)	Vale Creek	1977	0	–	0	–	Nonnative trout present
		1995	0		0	–	Restoration in progress
		2001	1.6		84	Increase	Population expansion
VIAA510M01 (Sevier)	Ranch Creek	1977	–	–	–		Unknown population
		1995	4.5	Increase ~~Increase~~	53	Increase	New discovery
		2001	6.4	Increase		Increase	Population expanded

VIAA650 (Sevier)	L Fk Sanford Cr	1977 1995 2002	0 0 2.9	– – Increase	0 0 35	– – Increase	No fish present No fish present Restored in 1999
VIAA660 (Sevier)	Sandy Creek	1977 1995 2002	0 0 >0	– – Increase	0 0 >0	– – Increase	No fish present No fish present Restored in 1999
VIAA440 (Sevier)	Tenmile Creek	1977 1995 2002	0 0 >0	– – Increase	0 0 >0	– – Increase	Nonnative trout present Nonnative trout present Restored in 2002
VIAA550 (Sevier)	Birch Creek	1977 1995 2002	0 0 >0	– – Increase	0 0 >0	– – Increase	Nonnative trout present Nonnative trout present Restored in 2001
VIAB050A02 (Beaver)	Birch Creek	1977 1994 2002	4.0 6.8 5.5	– Increase Decrease	29 71 13	– Increase Decrease	Remnant population Habitat improvement Drought impacted
VIAB070A (Beaver)	N Fk North Creek	1977 1994 2002	– 3.2 12.4	– Increase Increase	– 36 35	– Increase Stable	Remnant population Restored lower stream Population expansion
VIAB070A01 (Beaver)	Pole Creek	1977 1994 2002	0 0 >0	– – Increase	0 0 >0	– – Increase	Nonnative trout present Restoration in progress Drought impacted
VIAB010B (Beaver)	Pine Creek	1977 1994 2001	0 5.0 5.0	– Increase Stable	0 27 27	– Increase Stable	Nonnative trout present Restored in 1980 Population stable
VIAB070B02 (Beaver)	Briggs Creek	1977 1995 2002	0 1.0 1.0	– Increase Stable	0 36 37	– Increase Stable	No fish present Restored in 1988 Population stable
IAA020C02A (Virgin)	Reservoir Canyon	1977 1995 2002	3.2 3.2 0.3	– Stable Decrease	49 52 386	– Stable Increase	Remnant population Similar to past survey Drought impacted
IAA020C01 (Virgin)	Water Canyon	1977 1995 2001	2.9 0.8 1.0	– Decrease Stable	20 8 43	– Decease Increase	Remnant population Drought impacted Drought impacted
IAA060B (Virgin)	Leap Creek	1977 1995 2002a 2002b	0 2.7 5.3 ?	– Increase Increase Decrease	0 31 34 ?	– Increase Stable Decrease	Nonnative trout present Restored in 1986 Population expansion Impacted by fire
IAA060A (Virgin)	South Ash Creek	1977 1995 2002a 2002b	0 4.0 7.1 ?	– Increase Increase Decrease	0 27 105 ?	– Increase Increase Decrease	Nonnative trout present Restored in 1986 Populationexpansion. Impacted by fire
IAA060A01 (Virgin)	Harmon Cr	1977 1995 2002a 2002b	0 1.8 3.2 ?	– Increase Increase Decrease	0 31 92 ?	– Increase Increase Decrease	Nonnative trout present Restored in 1986 Population expansion Impacted by fire

IAA060A02 (Virgin)	**Mill Creek**	1977 1995 **2002a** **2002b**	0 5.1 8.0 ?	– Increase Increase Decrease	0 27 84 ?	– Increase Increase Decrease	Nonnative trout present Restored in 1986 Population expansion Impacted by fire
IAA040 (Virgin)	**Leeds Creek**	1977 1995 **2002a**	0 4.8 11.4	– Increase Increase	0 60 66	– Increase Stable	Nonnative trout present Restored in 1989 Population expansion
IAA040D (Virgin)	**Pig Creek**	1977 1995 2002	0 1.6 1.0	– Increase Decrease	0 53 7	– Increase Decrease	No fish present Restored in 1989 Drought impacted
IAA040C (Virgin)	**Spirit Creek**	**1977** 1995 2002	**0** 1.8 1.6	– Increase Stable	**0** 64 7	– Increase Decrease	No fish present Restored in 1988 Drought impacted
IAA040C01 (Virgin)	**Horse Creek**	**1977** 1995 2002	**0** **>0** 0.8	– – Increase	0 **>0** 16	– – Increase	No trout present Restored in 1995 Drought impacted

Table 2. Comparison of stream length (km) occupied by native Bonneville cutthroat trout over time and among drainages in southern Utah, 1977 to 2002.

Occupied stream distance by year	Sevier River drainage	Beaver River drainage	Virgin River drainage	All southern Utah areas combined
Known occupied stream length in 1977 *(remnant populations)*	*okm*	*4.0 km*	*6.1 km*	*10.1 km*
Total known occupied steam length in 1994-1995	14.2 km	15.9 km	25.9 km	56.0 km
Known *remnant* and restored stream length occupied in 2001-02 pre-wild fires	*9.0 km* 46.5 km	*6.3 km* [1] 17.5 km	*1.3 km* 38.5 km	*16.6 km* 102.5 km
Potential-temporary stream length losses post 2002 wild fires *(remnant* and restored)	*2.6 km* **0** km	*0 km* okm	*0 km* 23.6	*2.6 km* 23.6 km
Total known occupied stream length in 2001-2002 post fires	52.9 km	23.8 km	16.2 km	92.9 km

[1] *Remnant* portion of the North Fork North Creek was *0.8 km*; the remainder of the stream was restored.

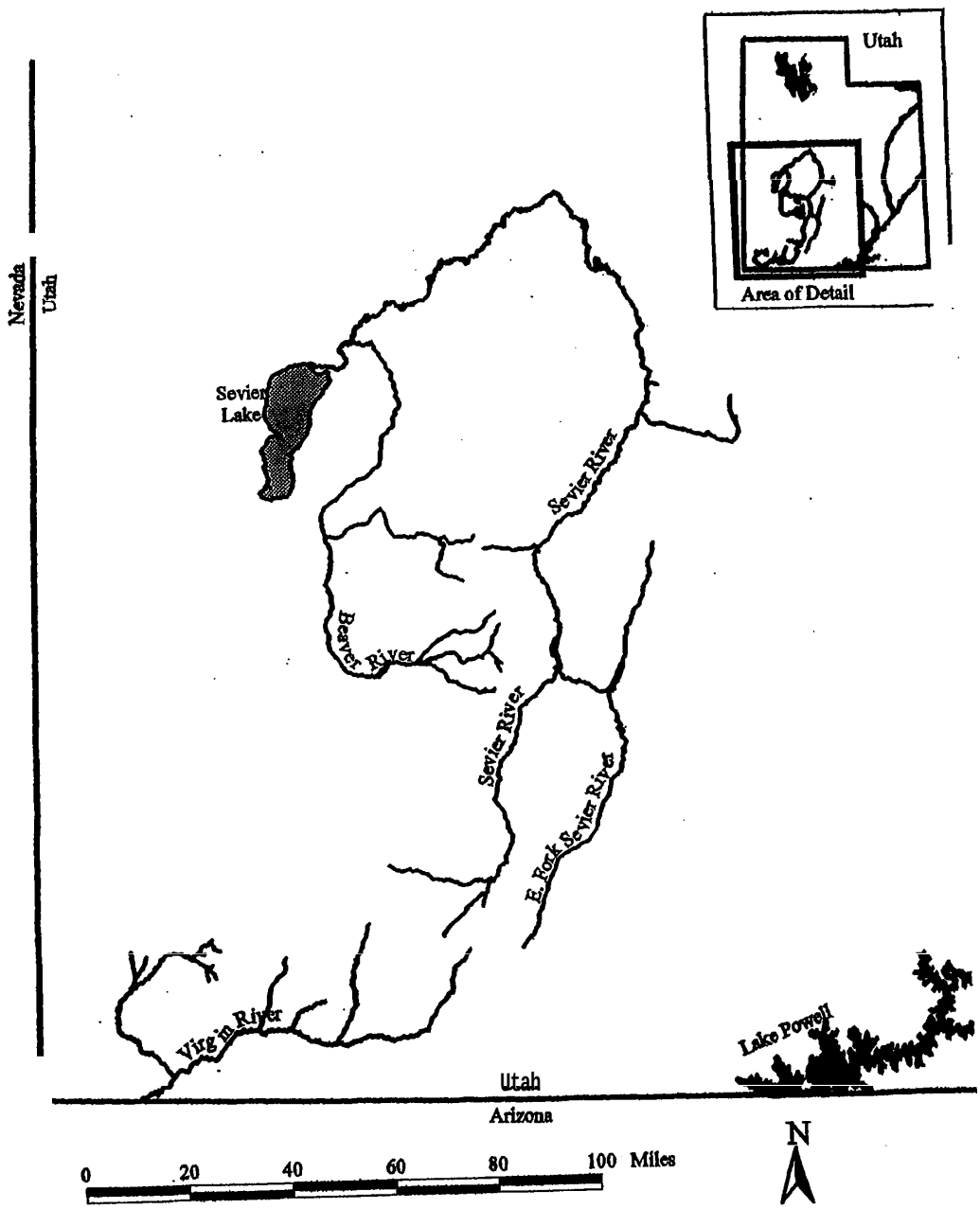


Figure 1. General locations of the Sevier, Beaver, and Virgin river basins in Southern Utah, showing major rivers and tributaries.

APPENDIX A

Survey forms and maps for individual streams – contained in the following pages as outlined below by drainage, stream, and tributary:

Sevier River drainage

- Deep Creek
- Sam Stowe Creek
- Threemile Creek
  - Delong Creek
  - Indian Hollow Creek
- Manning Creek
  - East Fork Manning Creek
  - Barney Outlet Creek
  - Vale Creek
- Ranch Creek
- Left Fork Sanford Creek
- Sandy Creek

Beaver River drainage

- Birch Creek
- North Fork North Creek
  - Pole Creek
- Pine Creek
- Briggs Creek

Virgin River drainage

- Reservoir Canyon Creek
- Water Canyon Creek
- Leap Creek
- South Ash Creek
  - Harmon Creek
  - Mill Creek
- Leeds Creek
  - Pig Creek
  - Spirit Creek
  - Horse Creek

Deep Creek – NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: **20 June 2002**
Biologist: **Hepworth, Whelan, and Chamberlain**

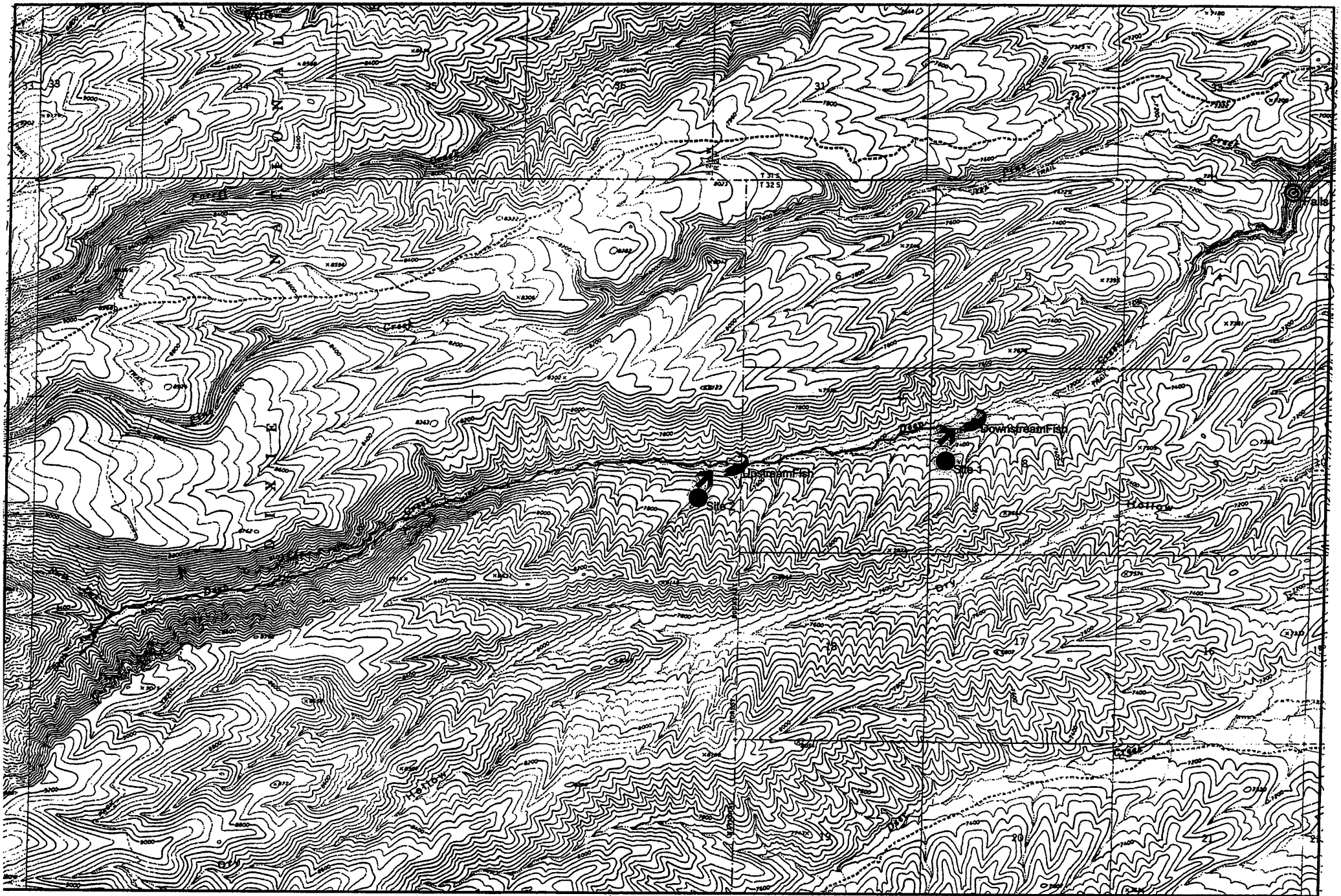
2. Stream Information –
Name, catalog number, section, county: **Deep Creek, VIAA510G01, Garfield County**
Upstream range of native trout (general description and GPS):
At Forest-BLM boundary – 120407183 E, 4210179 N
Downstream range of native trout (general description and GPS): **Lower elevations are too warm to support trout at 120409208 E, 4210555 N**
Location (GPS) and description of barriers: **Natural low flows in lower stream during summer and fall; also barrier falls at 12041921 E, 4212491 N, see map.**

Stream length – Occupied habitat: **2.5 km** Available habitat: **8.8 km**

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): **Gasoline backpack electro-shocker.**
Survey sites (general description and UTM):
Site **1: Upstream from lower end of fish distribution at 120409085 E, 4210528 N**
Site 2: **Upstream from Forest-BLM boundary at 120407006 E, 4210181 N**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m			
Mean stream width (meters) (n)	1.4 m			
Station area (hectares)	0.014 ha			
Number of fish 1st pass	9 CTBV			
Number of fish 2nd pass	0			
Population estimate (95% CI)	9 (± 0)			
Species and mean length (mm) (n)	214 mm (9)	**No Fish**		
Species and mean weight (g) (n)	108 g (9)			
Number of fish per km	90 per km			
Number of fish per hectare	643 per ha			
Biomass (kg) per km	9.7 kg per km			
Biomass (kg) per hectare	69 kg per ha			

4. Comments – **Nearly all CTBV upstream from the Forest-BLM boundary were lost from a recent wild fire. Most of the remaining CTBV were moved from Deep Creek (as part of this survey) to Tenmile Creek Rainstorms on the burnedarea (July 24) were expected to result in the loss of all remaining fish. This action was taken to preserve and eventually restore this population.**



Name: DEEP CREEK
Date: 12/10/2002
Scale: 1 inch equals 3448 feet

Location: 12 406620 E 4210330 N
Caption: Deep Creek, Garfield County, native cutthroat trout survey.

Sam Stowe Creek -- NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: 22-23 July, 2002
   Biologist: Whelan and Madsen

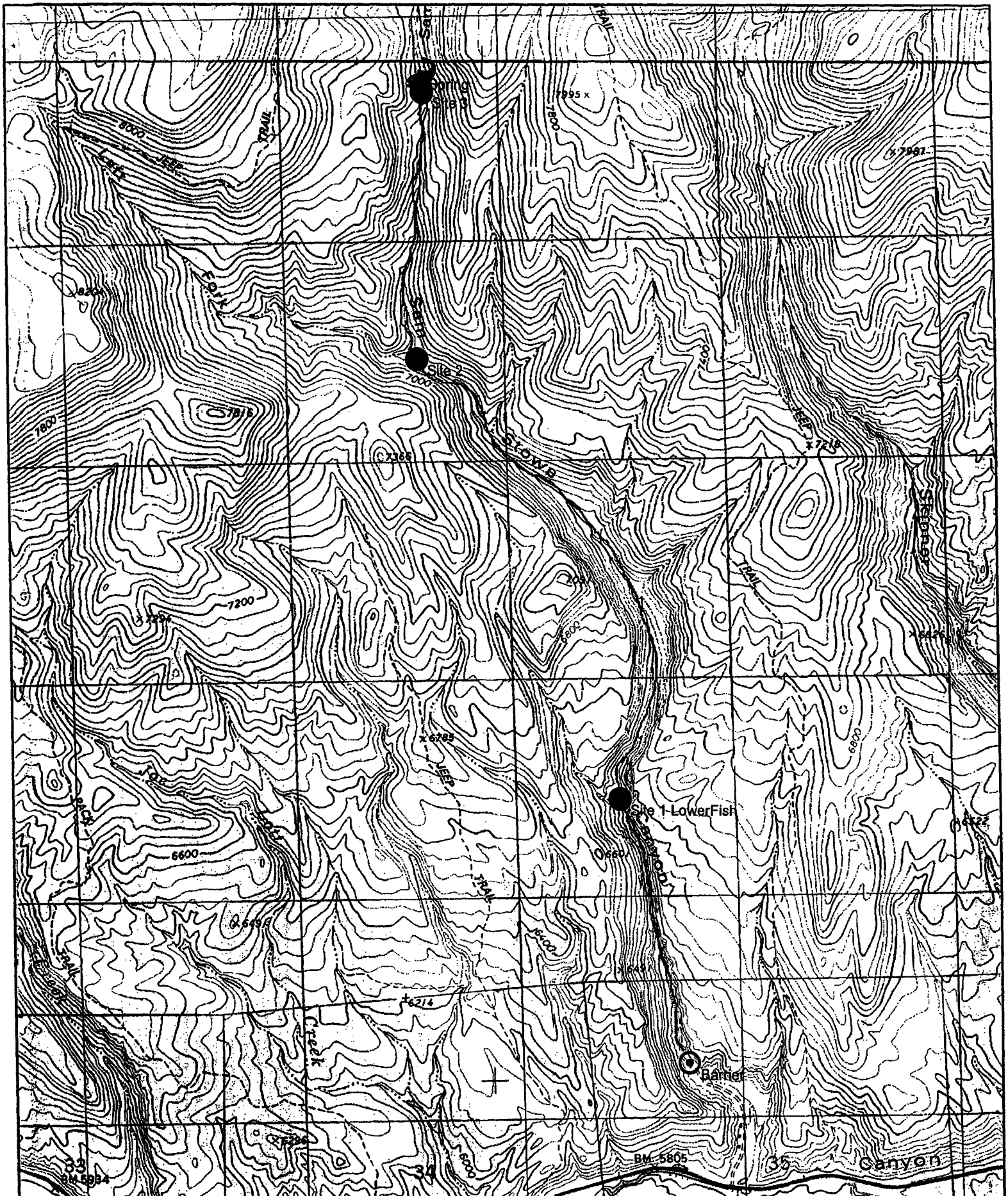
2. Stream Information –
   Name, catalog number, section, county: Sam Stowe Creek, VIAA360A, Sevier County
   Upstream range of native trout (general description and GPS): Headwater spring (see map) at 120383643 E, 4275747 N
   Downstream range of native trout (general description and GPS): Lower survey site 1, 120384485 E, 4272429 N (see map).
   Location (GPS) and description of barriers: Migration barrier constructed at lower end of stream: 120384778 E, 4271230 N (see map).

   Stream length – Occupied habitat: 4.7 km Available habitat: about 4.8 km

3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc): Battery power, backpack electro-shocker.
   Survey sites (general description and UTM):
   Site 1: About 1.5 km upstream from migration barrier at 120384485 E, 4272429 N
   Site 2: Downstream from confluence with Left Fork (dry) at 120383601E, 4274456 N
   Site 3: Downstream from headwater spring at 120383657 E, 4275663 N

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)	2.5 m	1.7 m	2.1 m	
Station area (hectares)	0.025 ha	0.017 ha	0.021 ha	
Number of fish 1st pass	1 CTBV	26 CTBV	33 CTBV	
Number of fish 2nd pass	0	14 CTBV	17 CTBV	
Population estimate (95% CI)	1 (± 0)	55 (± 16)	67 (± 15)	
Species and mean length (mm) (n)	43 mm (1)	51 mm (40)	132 mm (50)	
Species and mean weight (g) (n)	1 g (1)	6 g (40)	43 g (50)	
Number of fish per km	10 per km	550 per km	670 per km	
Number of fish per hectare	40 per ha	3,235 per ha	3,190 per ha	
Biomass (kg) per km	> 0	3.3 kg per km	29 kg per km	
Biomass (kg) per hectare	> 0	19 kg per ha	137 kg per ha	

4. Comments – The CTBV population is still expanding downstream since the 1997 reclamation and re-introduction.



Name: MARYSVALE CANYON
Date: 10/23/2002
Scale: 1 inch equals 1818 feet

Location: 12 383979 E 4273346 N
Caption: Sam Stowe Creek, Sevier County, native cutthroat trout 'survey

Threemile Creek – NATIVE **TROUT** POPULATION SURVEY FORM

1.. General Information – Date: July 2 and 19,2001
Biologist: Ottenbacher

2. Stream Information –

Name, catalog number, section, county: Threemile Creek, VI AA 680, Garfield

Upstream range of native trout (general description and GPS): At natural barrier (log jam, just upstream from survey Site 1) about 200 m upstream from confluence with Delong Creek at **12363302E, 4191553N**

Downstream,range of native trout (general description and GPS): Irrigation diversion at lower end of BLM land – **1237199E, 4192605N**

Location (GPS) and description of barriers: Constructed barrier at BLM road crossing at **12369177E, 4191216N.** Natural barriers on USFS at **1236668E, 4191981N,** and just upstream from survey Site 3 (logjam).

Stream length – Occupied habitat: 11.2 **km** Available habitat: 13.7 km

3. Survey Site Information (attach map and field survey form) –

Survey method and equipment **(gas,** battery, settings, block nets, etc): Backpack gas electro-shocker, upstream block net.

Survey sites (general description and UTM):

Site 1: Just upstream from USFS boundary at **120367598E, 4191952N**

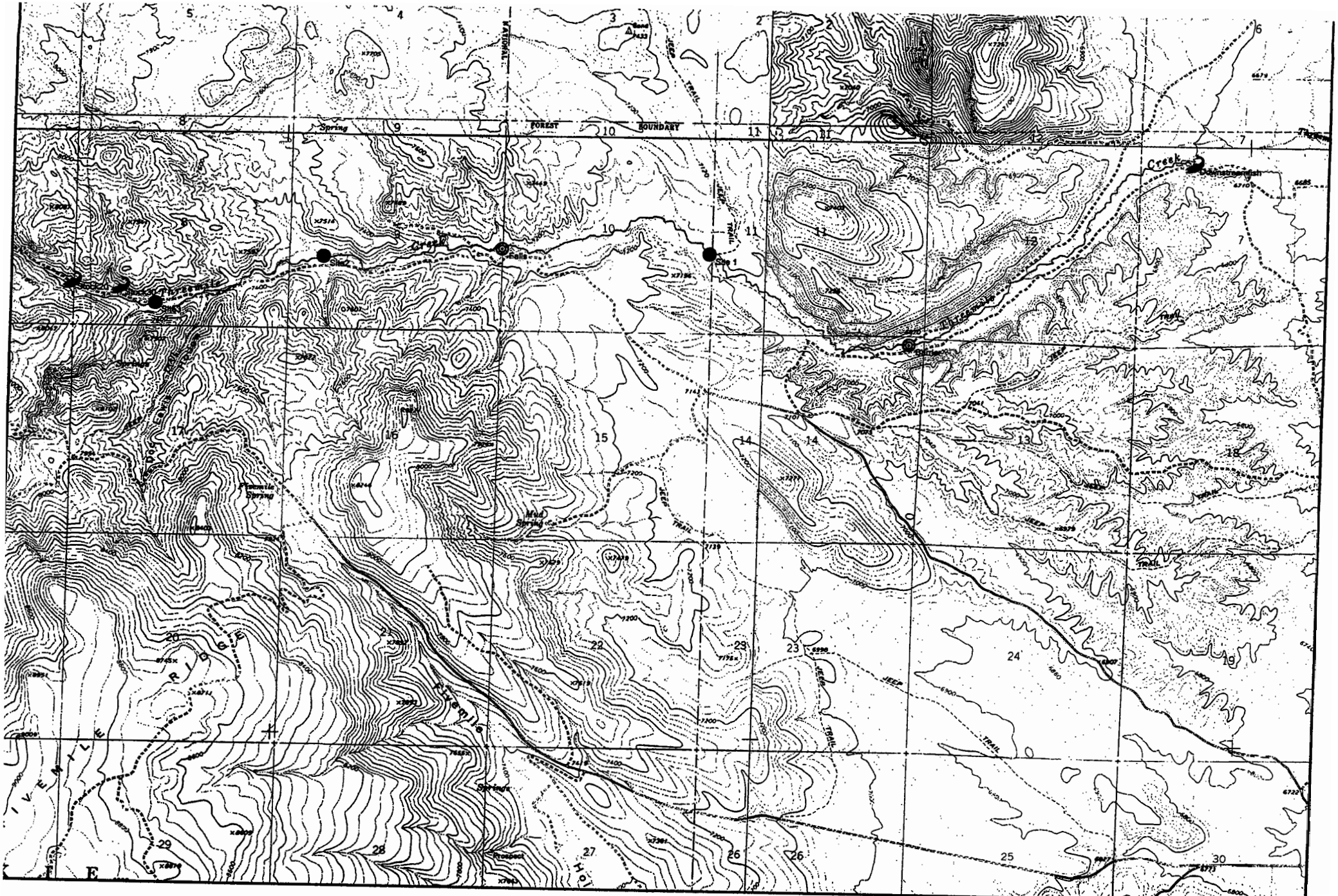
Site 2: About 1.6 km (1.0 mile) downstream from Site 1 at **120364728E, 4191919N**

Site 3: Just upstream from confluence with Delong Creek at 123634043;, **4191556N**

Parameter	Site1 **	Site 2	Site 3	
Length of station (meters)	100 m	100 m	100 m	
Mean **stream** width (meters) (n)	1.26 m (10)	1.22 m (10)	1.02 m (10)	
Station area (hectares)	0.013 ha	0.012 ha	0.010 ha	
Number of fish 1st pass	3 CTBV	8 CTBV	14 CTBV	
Number of fish 2nd pass	0	0	4 CTBV	
Population estimate (95% CI)	3 (± 0)	8 (± 0)	19 (± 4)	
Species and mean length (mm) (n)	CTBV 221 mm (3)	CTBV 166 mm (8)	CTBV 152 mm (18)	
Species and mean weight (g) (n)	CTBV 103 g (3)	CTBV 52 g (8)	CTBV 40 g (18)	
Number of fish per km	30 CTBV	80 CTBV	190 CTBV	
Number of fish per hectare	231 CTBV	667 CTBV	1,900 CTBV	
Biomass (kg) per km	0.3 kg per km	0.4 kg per km	7.6 kg per km	
Biomass (kg) per hectare	23.8 kg per ha	34.7 kg per ha	76.0 kg per ha	

** Site contained numerous mountain suckers, leatherside chubs, and speckled dace (see field data forms).

4. Comments – **CTBV** have been more abundant in the lower stream than was found in 2001. Flash floods reduced trout abundance in the lower reaches. During 2001 we moved 50 **CTBV** upstream of the natural barrier above Site 3 (30 **BVCT** released at **363062E, 4191609N** and 20 **BVCT** released at **362353E, 4192012N).**



Name: FIVEMILE RIDGE
Date: 12/10/2002
Scale: 1 inch equals 3076 feet

Location: 12 367310 E 4190404 N
Caption: Threemile Creek, Garfield County, native cutthroat trout survey.

Delong Creek – NATIVE TROUT POPULATION SURVEY FORM

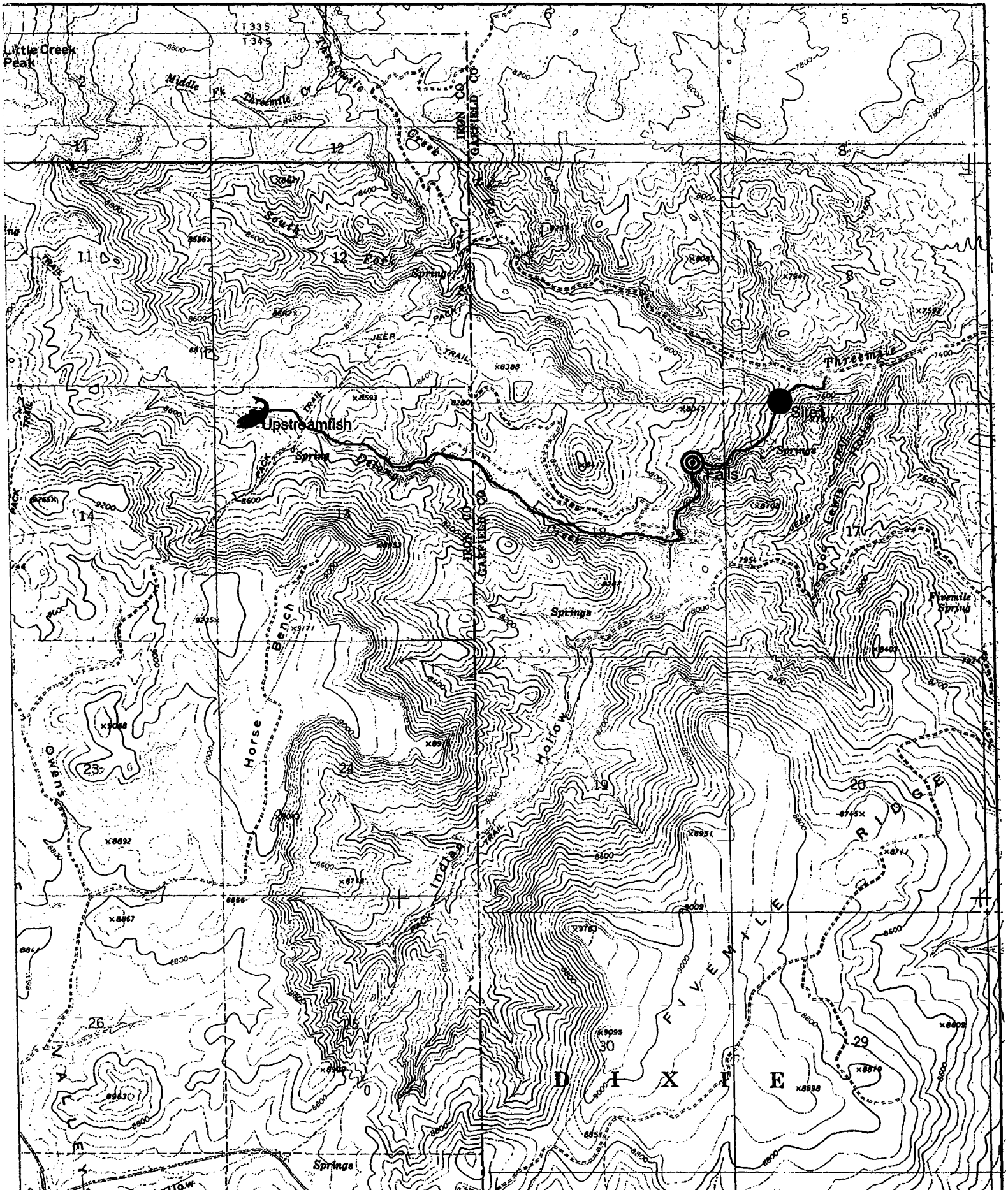
1. General Information – Date: July 2,2001
Biologist: Ottenbacher

2. Stream Information –
Name, catalog number, section, county: Delong Creek, VI AA 680 A, Garfield
Upstream range of native trout (general description and GPS): Near headwater springs at about **12359796E, 4191366N.** Need to verify exact location during 2002.
Downstream range of native trout (general description and GPS): Confluence with Threemile Creek.
Location (GPS) and description of barriers: Natural waterfall about 1.2 km upstream from Threemile Creek at **12362659E, 4190996N.**
Stream length – Occupied habitat: 5.3 km Available habitat: 5.3 km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Backpack gas **electro-**shocker, upstream block net.
Survey sites (general description and UTM):
Site 1: Just upstream from Threemile Creek confluence **(120363429E, 4191477N)**
Site 2:
Site 3:

Parameter	Site I	Site 2	Site 3	Site 4
Length of station (meters)	100 m			
Mean stream width (meters) (n)	1.46 m (10)			
Station area (hectares)	0.0 15 ha			
Number of fish 1st pass	36 **CTBV**			
Number of fish 2nd pass	5 **CTBV**			
Population estimate (95% CI)	42 (± 1)			
Species and mean length **(mm) (n)**	CTBV 152 mm (41)			
Species and mean weight **(g) (n)**	CTBV **51 g (41)**			
Number of fish per km	420 CTBV			
Number of fish per hectare	2,800 **CTBV**			
Biomass (kg) per km	21.4 kg per km			
Biomass (kg) per hectare	142.8 kg per ha			

4. Comments – Upstream distribution of CTBV needs to be checked again in the near future and another survey site added in the future to measure fish abundance in the upper stream.



Name: FIVEMILE RIDGE
Date: 12/10/2002
Scale: *1* inch equals *2500* feet

Location: 12 361378 E 4190171 N
Caption: Delong Creek. Garfield County, native cutthroat trout survey, shown in with Threemile Creek and Indian Hollow.

Indian Hollow – NATIVE TROUT POPULATION SURVEY FORM

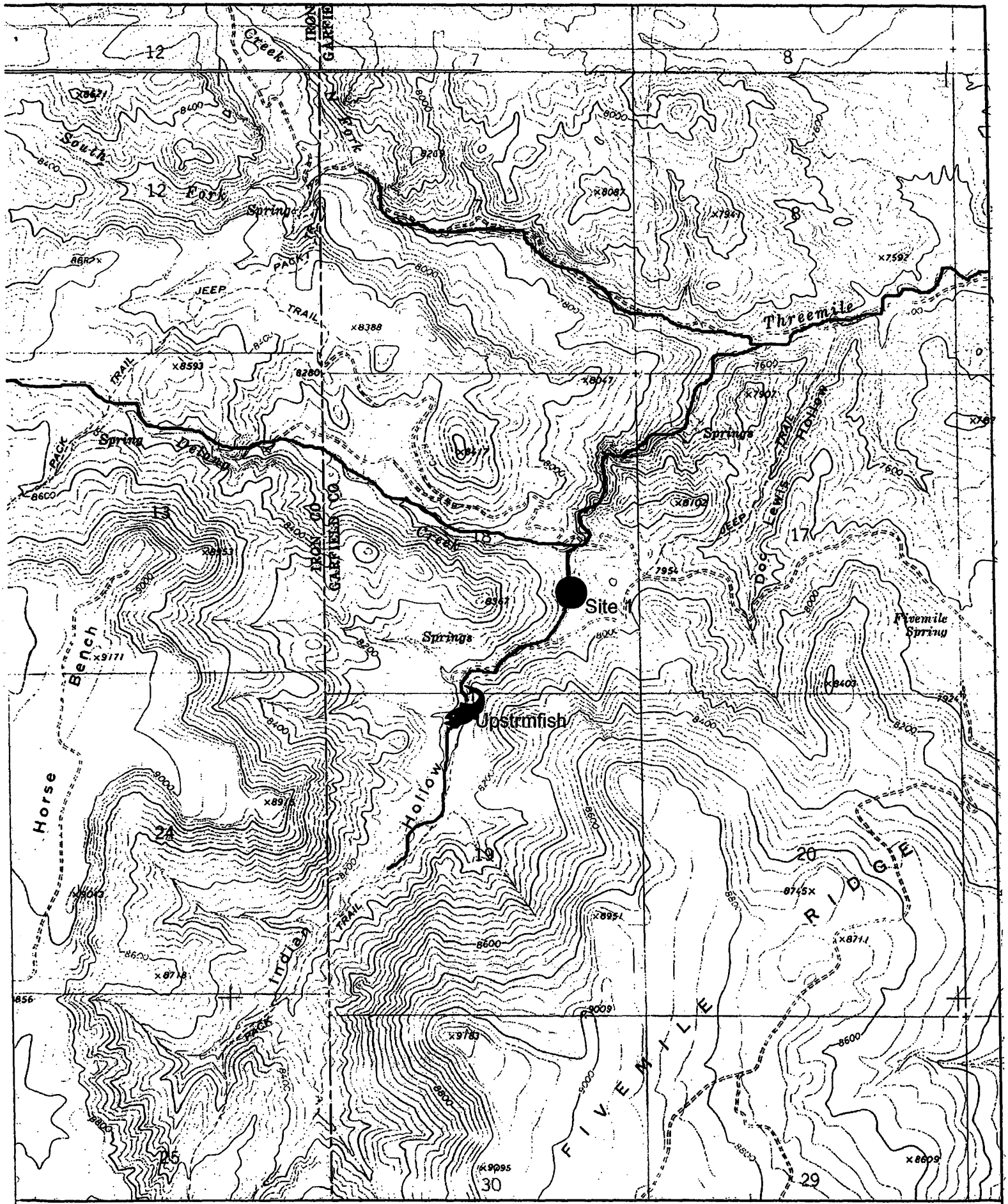
1. General Information – Date: July 19,2001
   Biologist: Ottenbacher

2. Stream Information –
   Name, catalog number, section, county: Indian Hollow, **VI** AA 680 A 01, Garfield
   Upstream range of native trout (general description and GPS): Just upstream from spring tributary at **12361922E, 4189726N.**
   Downstream range of native trout (general description and GPS): Confluence with Delong Creek.
   Location (GPS) and description of barriers: None
   Stream length – Occupied habitat: 1.4 **km** Available habitat: 1.4 km

3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc): Backpack gas electro-shocker; no block nets.
   Survey sites (general description and UTM):
   Site 1: 300 m upstream from Delong Creek confluence **(120362450E, 4190292N)**
   Site 2:
   Site 3:

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m			
Mean stream width (meters) (n)	**0.64** m (10)			
Station area (hectares)	**0.006** ha			
Number of fish **1st** pass	**5** CTBV			
Number of fish 2'' pass	**0**			
Population estimate (95% CI)	**5 (± 0)**			
Species and mean length **(mm) (n)**	CTBV 182 mm (5)			
Species and mean weight **(g) (n)**	CTBV **79 g (5)**			
Number of fish per km	**50 CTBV**			
Number of fish per hectare	833 **CTBV**			
Biomass (kg) per km	4.0 kg per km			
Biomass (kg) per hectare	65.8 kg per ha			

4. Comments – Very small stream, Upstream range of fish is limited because of low stream flows,



Name: FIVEMILE RIDGE
Date: 12/19/2001
Scale: 1 inch equals 2000 feet

Location: 12 362094 E 4190250 N
Caption: Indian Hollow native trout survey

Manning Creek – NATIVE TROUT POPULATION **SURVEY** FORM

1. General Information – Date: 26 June through 3 July, 2001
Biologist: Whelan and Ottenbacher

2. Stream Information –

Name, catalog number, section, county: Manning Creek, **VI** AA 430, Piute County

Upstream range of native trout (general description and GPS): Manning Meadow Reservoir at **1246888E, 4260904N.**

Downstream range of native trout (general description and GPS): Irrigation Pond, end of canal at **12398945E, 4249435N.**

Location (GPS) and description of barriers: Constructed barrier near irrigation diversion at **120399428E, 4250399N.** Also, natural barrier falls **between** Site 2 and Site 3.

Stream length – Occupied habitat: 17.2 km Available habitat: 17.2 **km**

3. Survey Site Information (attach map and field survey **form) –**

Survey method and equipment (gas, battery, settings, block nets, etc):

Cofflelt Mark **10** backpack electro-shocker, 60 pps 250 v, with block nets.

Survey sites (general description and UTM):

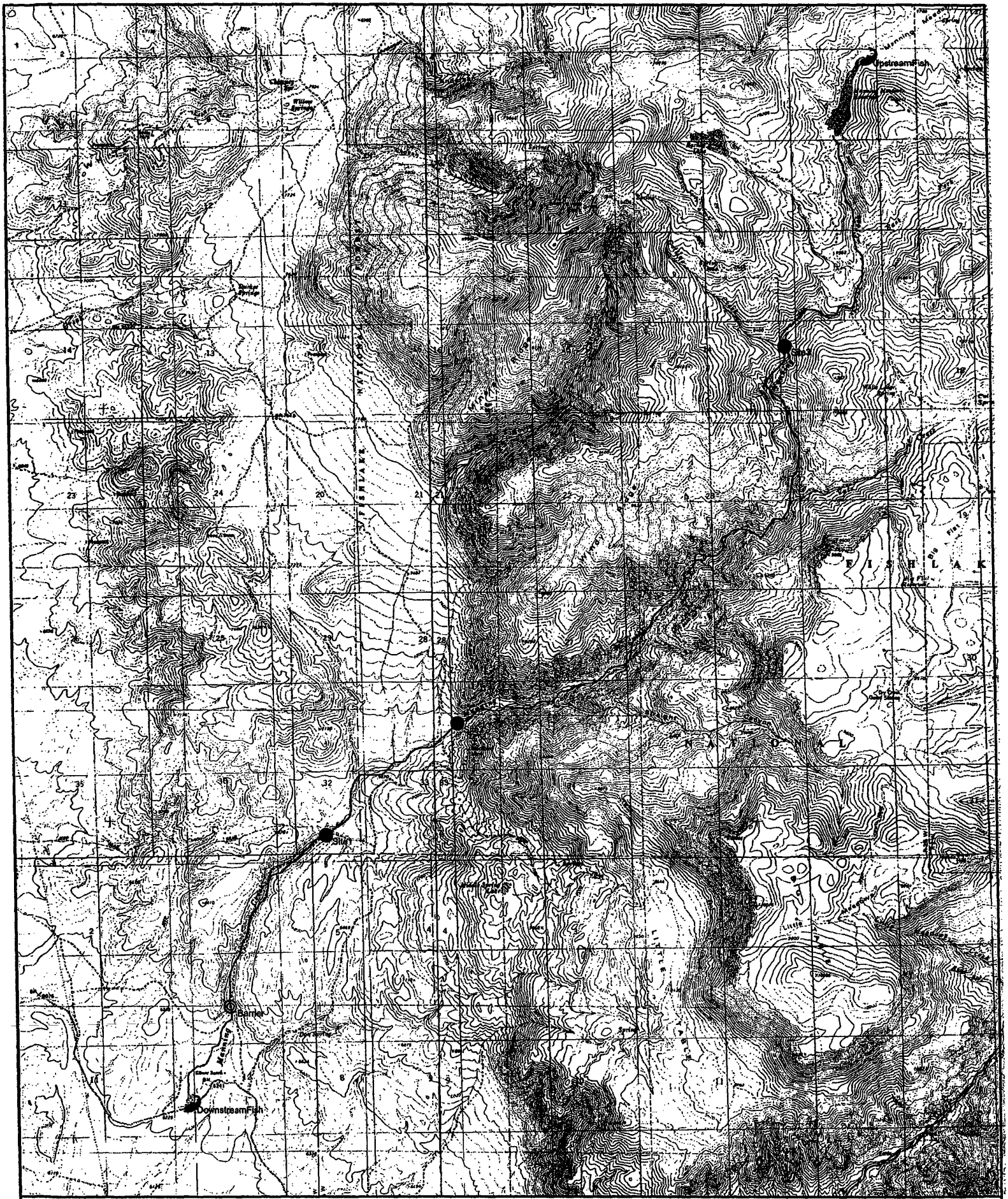
Site 1: On BLM lands near confluence with side **spring** at **120400530E, 4252291N.**

Site 2: Near **Forest/BLM** boundary (mouth of canyon) at **120401977E, 4253464N.**

Site 3: Downstream from confluence with Collins Creek at **120405864E, 4257700N.**

Parameter	Site 1	Site 2	Site 3	
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)	2.9 m (10)	2.8 m (10)	3.0 m (10)	
Station area (hectares)	0.029 ha	0.028 ha	0.30 ha	
Number of fish 1st pass	26 **CTBV**	44 **CTBV**	26 **CTBV**	
Number of fish 2'' pass	5 **CTBV**	**11 CTBV**	**2 CTBV**	
Population estimate (95% CI)	32 **(± 2)**	58 (± 6)	28 **(± 0)**	
Species and mean length **(mm) (n)**	**CTBV** 158 mm (31)	**CTBV** 155 mm (55)	**CTBV** 148 mm (26)	
Species and mean weight **(g) (n)**	**CTBV** 53 **g (31)**	**CTBV** **50 g (55)**	**CTBV** **48 g (26)**	
Number of fish per km	320 **CTBV**	580 **CTBV**	280 **CTBV**	
Number of fish per hectare	1,103 **CTBV**	2,071 **CTBV**	933 **CTBV**	
Biomass (kg) per km	17.0 kg per km	29.0 kg per km	13.4 kg per km	
Biomass (kg) per hectare	58.5 **kg** per ha	103.6 **kg** per **ha**	44.8 **kg** per ha	

4. Comments – Natural reproduction at all survey sites.



Name: MARYSVALE PEAK
Date: 12/1012002
Scale: 1 inch equals 4444 feet

Location: 12 402626 E 4254904 N
Caption: Manning Creek, Piute County, native cutthroat trout survey.

East Pork Manning Creek – NATIVE TROUT POPULATION SURVEY FORM

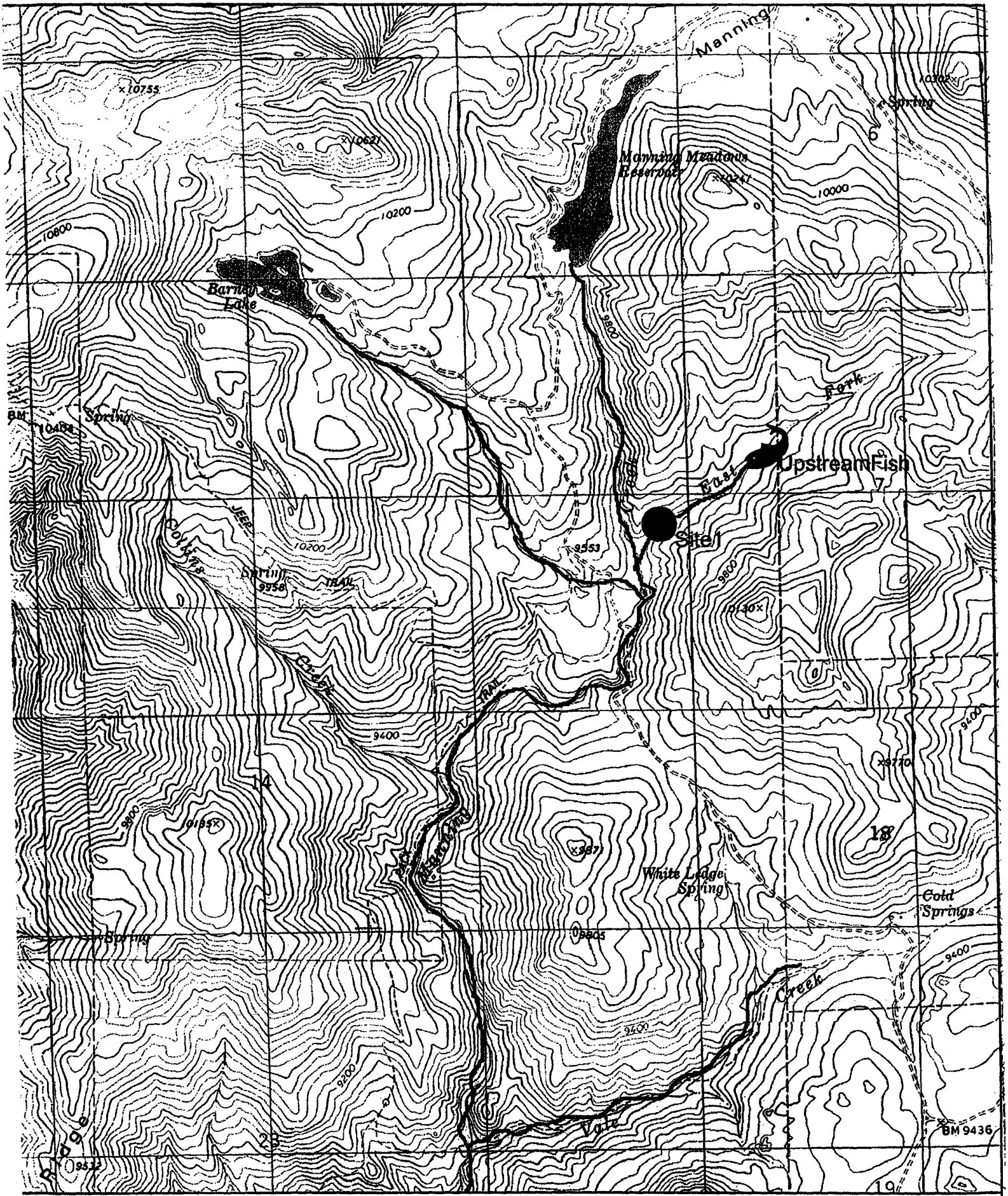
1. General Information – Date: 26 June through 3 July, 2001
Biologist: Ottenbacher

2. Stream Information –
Name, catalog number, section, county: East Pork Manning Creek, VI AA 430 B, Piute
Upstream range of native trout (general description and GPS): Where stream flows and gradient are not conducive for trout at **120407358E, 4259202N.**
Downstream range of native trout (general description and GPS): Confluence Manning Creek.
Location (GPS) and description of barriers: None.
Stream length – Occupied habitat: 1.0 **km** Available habitat: 1.0 km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Backpack electro-shocker, no block nets.
Survey sites (general description and UTM):
Site 1: About 200 m upstream from confluence at **120406855E, 4258841N.**
Site 2:
Site 3:

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 rn			
Mean stream width (meters) (n)	0.8 m (10)			
Station area (hectares)	0.008 ha			
Number of fish 1st pass	**2 CTBV**			
Number of fish 2nd pass	0			
Population estimate (95% CI)	**2 (± 0)**			
Species and mean length **(mm) (n)**	CTBV 171 mm (2)			
Species and mean weight **(g) (n)**	CTBV **58 g (2)**			
Number of fish per km	20 **CTBV**			
Number of fish per hectare	250 CTBV			
Biomass (kg) per km	1.2 kg per km			
Biomass (kg) per hectare	14.5 kg per ha			

4. Comments – Small stream. Most CTBV were yearling or young-the-year fish. The East Pork appears to be an important spawning tributary to the main stem of Manning Creek.



Name: MARYSVALEPEAK
Date: 12/10/2002
Scale: 1 inch equals 1818 feet

Location: 12 406134 E 4258518 N
Caption: East Fork Mannin a Creek. Plute County, native cutthroat trout survey. Tributary to Manning Creek.

Barney Creek – NATNE TROUT POPULATION SURVEY FORM

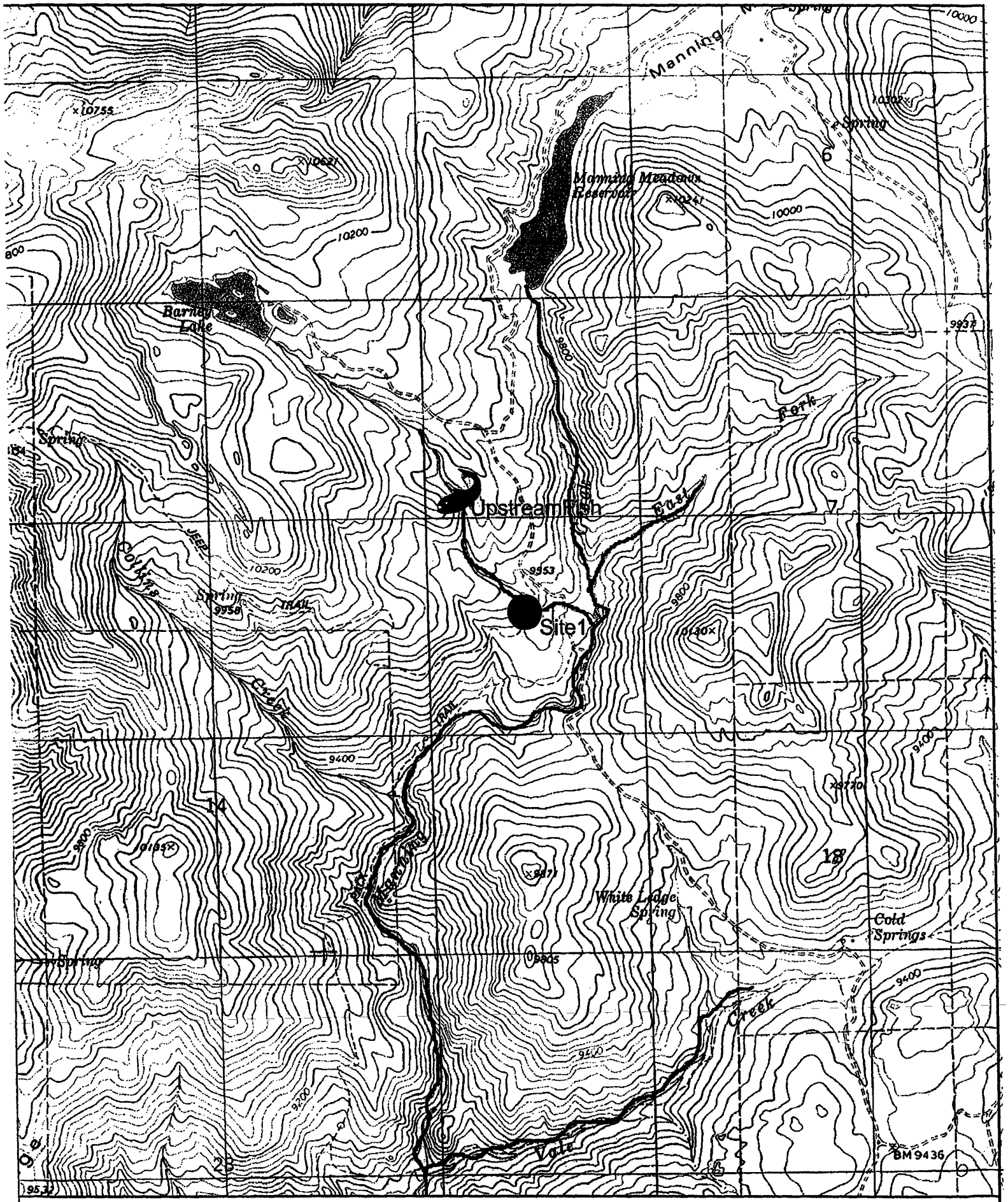
1. General Information – Date: 26 June through 3 July, 2001
Biologist: Whelan

2. Stream Information –
Name, catalog number, county: Barney Creek (Barney Res outlet), VI AA 430 A, Piute
Upstream range of native trout (general description and GPS): Where stream pool structure and steep gradient are not conducive for trout at **120406113E, 4259183N.**
Downstream range of native trout (general description and GPS): Confluence with Manning Creek.
Location (GPS) and description of barriers: None.
Stream length – Occupied habitat: 1.2 km Available Habitat: 2.4 km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Coffelt Mark 10 backpack electro-shocker 60 pps, 250 v, with block nets.
Survey sites (general description and UTM) :
Site 1: Near road crossing to Collins Creek at **120406404E, 4258671N.**
Site 2:
Site 3:

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m			
Mean stream width (meters) (n)	1.1 m (10)			
Station area (hectares)	0.011 ha			
Number of fish 1st pass	3 CTBV			
Number of fish 2nd pass	1 CTBV			
Population estimate (95% CI)	4 (± 2)			
Species and mean length (mm) (n)	CTBV 111 mm (4)			
Species and mean weight (g) (n)	CTBV 16 g (4)			
Number of fish per km	40 CTBV			
Number of fish per hectare	364 CTBV			
Biomass (kg) per km	0.6 kg per km			
Biomass (kg) per hectare	5.8 kg per ha			

4. Comments – Trout become more abundant near the confluence with Manning Creek. Most trout were small, yearlings or young-of-the-year. Barney Creek appears to be an important spawning tributary to Manning Creek, Extensive habitat improvement could expand trout range and numbers.



Name: MARYSVALE PEAK
Date: 1211012002
Scale: 1 inch equals 1818 feet

Location: 12 406347 E 4258610 N
Caption: Barney Outlet Creek, Piute County, native cutthroat trout survey.
Tributary to Manning Creek.

Vale Creek – NATIVE TROUT POPULATION SURVEY FORM

1. General **Information** – Date: 26 June through 3 July, 2001
   Biologist: Whelan

2. Stream Information –
   Name, catalog number, section, county: Vale Creek, VI AA 430 C, Piute County
   Upstream range of native trout (general description and GPS): About 1.6 **km** upstream from confluence with Manning Creek near confluence of spring tributaries at 12472223, **425627N.**
   Downstream range of native trout (general description and GPS): Confluence with Manning Creek.
   Location (GPS) and description of barriers: None

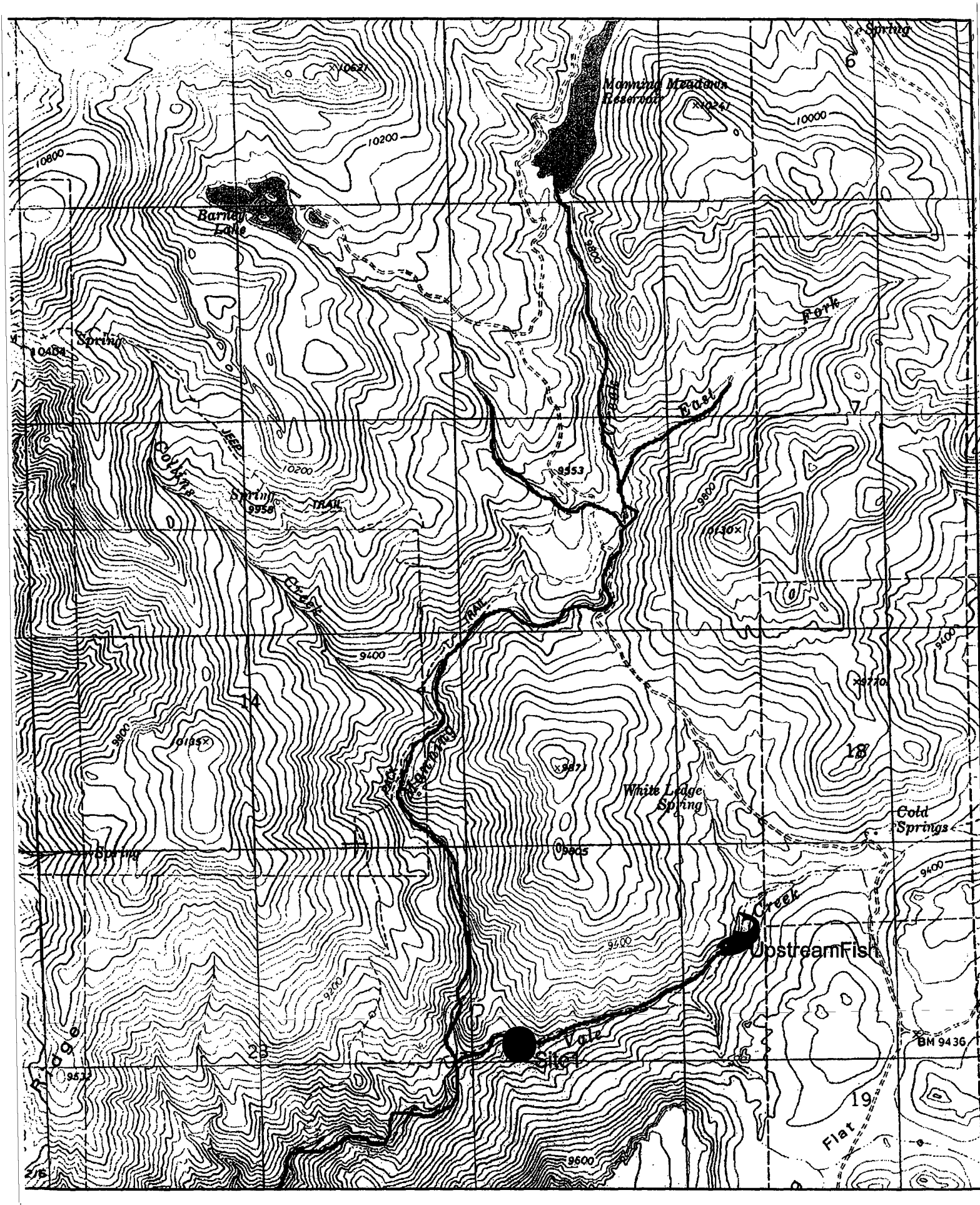
   Stream length – Occupied habitat: 1.6 km Available habitat: 1.6 km

3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc): Coffelt Mark 10 backpack electro-shocker; no block nets.

   Survey sites (general description and **UTM**) :
   Site **1**: About 400 m upstream from confluence at **120406260E, 4256088N.**
   Site 2:
   Site 3:

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m			
Mean stream width (meters) (n)	1.7 m (10)			
Station area (hectares)	0.017 ha			
Number of fish **1st** pass	25 CTBV			
Number of fish **2nd** pass	13 CTBV			
Population estimate (95% CI)	51 (± 14)			
Species and mean length (mm) **(n)**	CTBV 110 **mm** (34)			
Species and mean weight (g) **(n)**	**CTBV 28 g (34)**			
Number of fish per km	510 CTBV			
Number of fish per hectare	3,000 ha			
Biomass (kg) per km	14.3 kg per km			
Biomass (kg) per hectare	84.0 kg per ha			

4. Comments – Small tributary stream containing mostly yearling and young-of-the-year CTBV. Vale Creek appears to be an important spawning tributary to Manning Creek.



Name: MARYSVALE PEAK
Date: 12/1012002
Scale: 1 inch equals 1818 feet

Location: 12 406172 E 4258127 N
Caption: Vale Creek, Piute County, native cutthroat trout survey. Tributary to Manning Creek.

Ranch Creek – NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: **23 July and 8 August, 2001**
Biologist: **Ottenbacher**

2. Stream Information –

Name, catalog number, section, county: **Ranch Creek** VI **AA 510 M 01, Garfield**

Upstream range of native trout (general description and GPS): **Just downstream from meadow and north spring tributary at 12418638 E, 4194715 N**

Downstream range of native trout (general description and GPS): **At barrier on state land upstream from private fish pond, at 12414262 E, 4195240 N**

Location (GPS) and description of barriers: **Culvert barrier on state land provided by private land owner and natural barrier at 12417378 E, 4194977 N**

Stream length – Occupied habitat: **6.4 km** Available habitat: **7.0 km**

3. Survey Site Information (attach map and field survey form) –

Survey method and equipment (gas, battery, settings, block nets, etc): **Backpack gas electroshocker; no blocknets.**

Survey sites (general description and UTM):

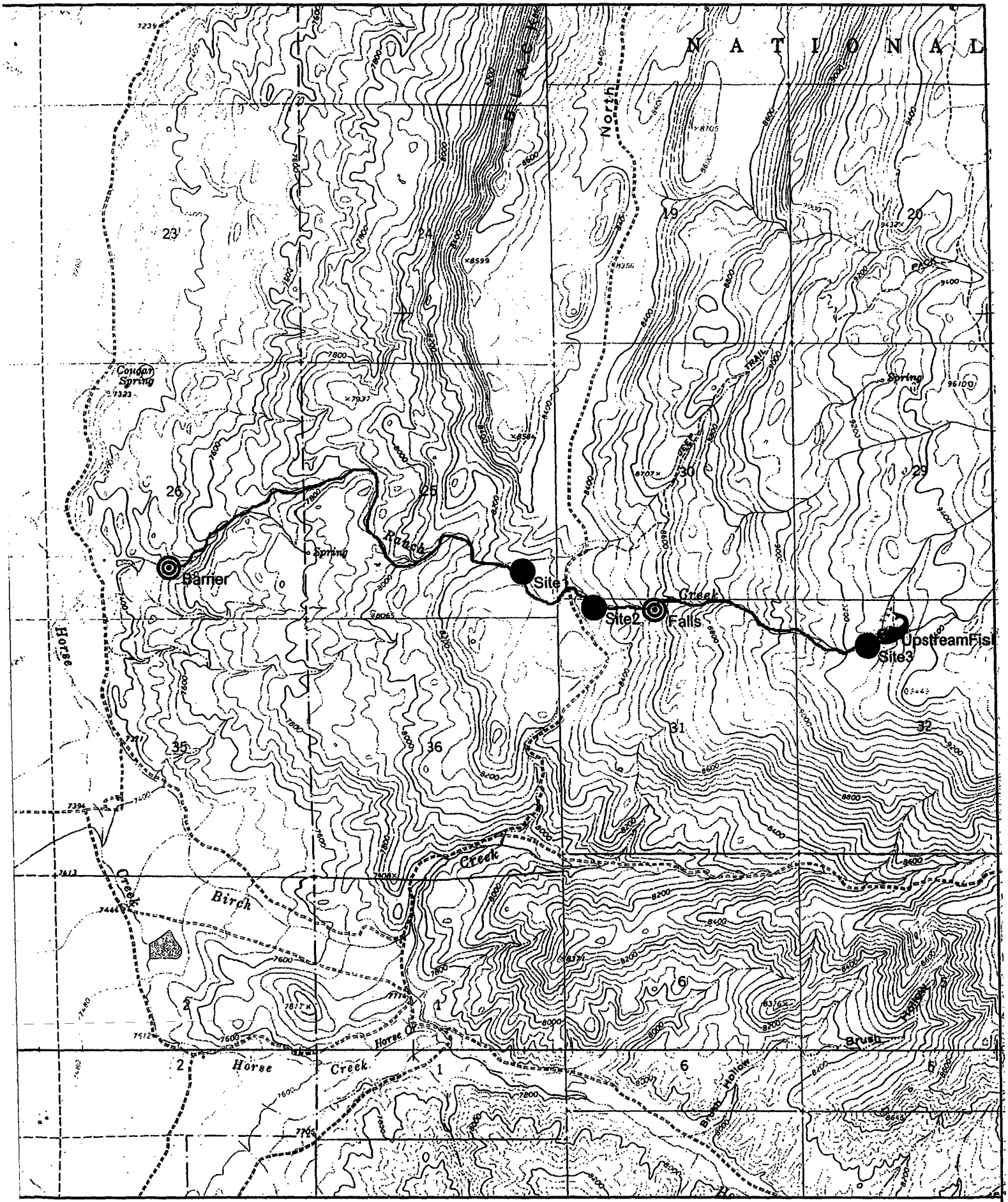
Site 1: **About 0.1 km downstream from access road at 12416513 E, 419595N**

Site **2: About 150 m upstream from access road crossing at 12416900E, 4194992N**

Site **3: Just below meadow and spring tributary confluence at 12418618E, 4194676N**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)	1.2 m (10)	1.4 m (10)	1.5 m (10)	
Station area (hectares)	0.012 ha	0.014 ha	0.015 ha	
Number of fish I" pass	13 CTBV	26 CTBV	6 CTBV	
Number of fish 2nd pass	3 CTBV	2 CTBV	2 CTBV	
Population estimate (95 % CI)	16 (± 1)	28 (± 1)	9 (± 4)	
Species and mean length (mm) (n)	CTBV 157 mm (16)	CTBV 157 mm (28)	CTBV 162 mm (8)	
Species and mean weight (g) (n)	CTBV 56 g (16)	CTBV 50 g (28)	CTBV 71 g (8)	
Number of fish per km	160 CTBV	280 CTBV	90 CTBV	
Number of fish per hectare	1,333 CTBV	2,000 CTBV	600 CTBV	
Biomass per km (kg)	8.96 kg per km	14.00 kg per km	6.39 kg per km	
Biomass per hectare (kg)	74.6 kg p	100.0 kg per ha	42.6 kg per ha	

4. Comments – **In 1997, about 50 CTBV were taken from the stream reach near the access road and moved upstream above the natural barrier into a previosly fish-less headwater section of stream. Site 3 shows current population status in this area, and the map shows current upstream fish distribution. Other tributary streams to Ranch Creek where transplants were made, also in 1995, failed to develop wild populations likely because streams are too small or too cold.**



Name: GRASS LAKES
Date: 12/1012002
Scale: 1 inch equals 2500 feet

Location: 12 416346 E 4194980 N
Caption: Ranch Creek, Garfield County, native cutthroat trout survey.

Left Fk. Sanford Creek -- NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: **31** July **2002**
   Biologist: Ottenbacher and Brazier

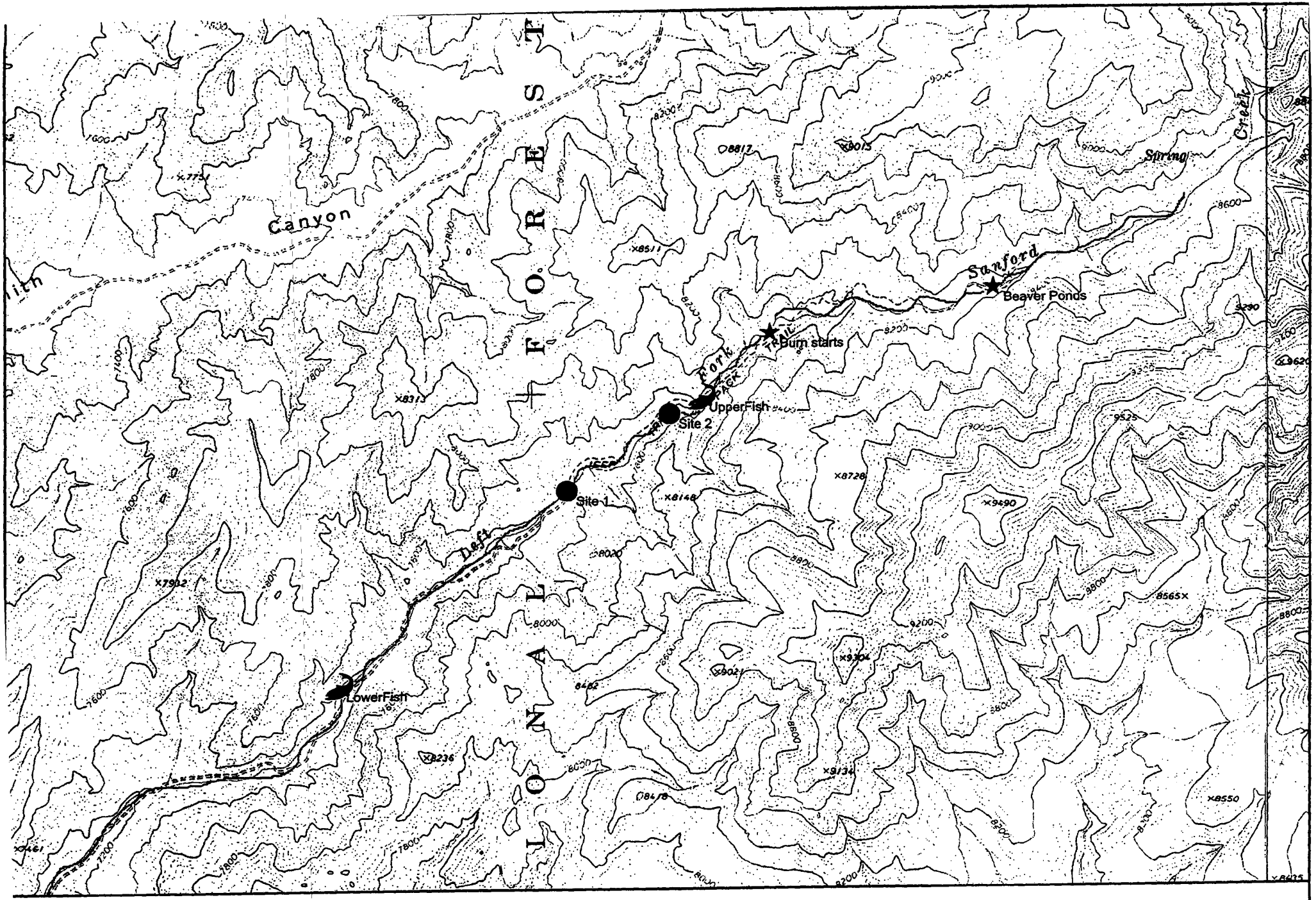
2. Stream Information –
   Name, catalog number, section, county: Left Fork Sanford Creek, VIAA650A, Garfield Co.
   Upstream range of native trout (general description and GPS):
   Midway up the canyon at **120387358** E, **4201702** N.
   Downstream range of native trout (general description and GPS):
   Near end of road at **120385546** E, **4200297** N
   Location (GPS) and description of barriers:
   Stream de-watered near confluence with Right Fork
   Stream length – Occupied habitat: **2.9** km Available habitat: **6.8** km

3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc):
   Battery power, backpack electro-fishing unit

   Survey sites (general description and UTM):
   Site 1: About **1.0** km below upper end of **fish** distribution at **120386703** E, **4201260** N
   Site 2: Near upper end of fish distribution at **120387358** E, **4201702** N

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m		
Mean stream width (meters) (n)	1.3 m	1.6 m		
Station area (hectares)	0.013 ha	0.016 ha		
Number of fish 1st pass	9 CTBV	6 CTBV		
Number of fish 2nd pass	0	0		
Population estimate (95% CI)	9 (± 0)	6 (± 0)		
Species and mean length (mm) (n)	167 mm (9)	190 mm (6)		
Species and mean weight (g) (n)	66 g (9)	85 g (6)		
Number of fish per km	90 per km	60 per km		
Number of fish per hectare	692 per h a	375 per ha		
Biomass (kg) per km	5.9 kg per km	5.1 kg pre km		
Biomass (kg) per hectare	45 kg per ha	25 kg pre ha		

4. Comments – A total of **210** CTBV were transplanted from Deep Creek to Left Fork Sanford Creek in **1999** to establish a population of native trout in a barren stream. The current survey showed various sizes and ages of CTBV established with natural reproduction.



Name: BLIND SPRING MT
Date: 10/28/2002
Scale: 1 inch equals 2000 feet

Location: 12 387165 E 4201459 N
Caption: Left Fork Sanford Creek, Garfield County, native cutthroat trout survey.

Sandy Creek -- NATIVE **TROUT** POPULATION SURVEY FORM

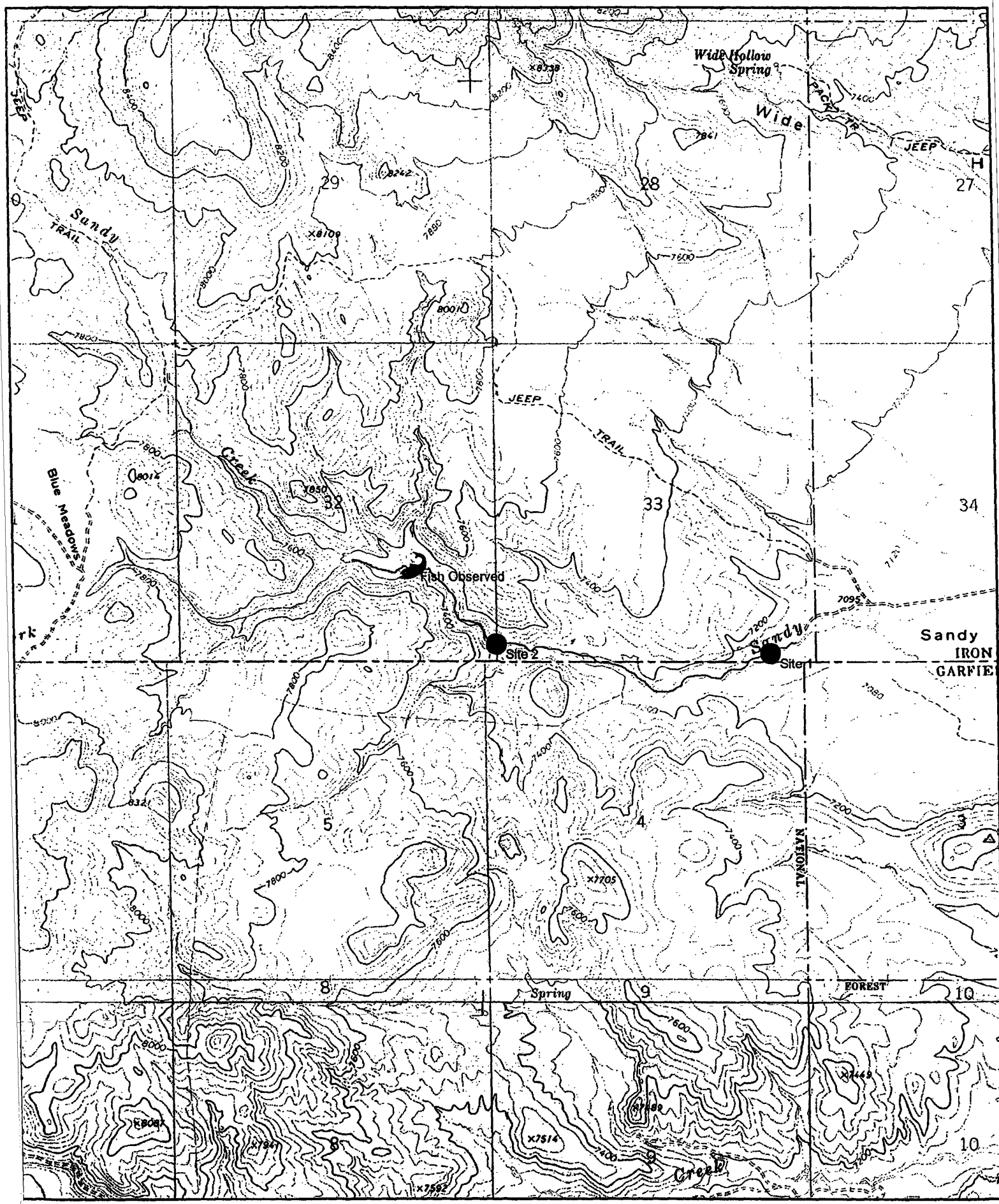
1. General Information – Date: **24** August **2001**
Biologist: Ottenbacher and Beckstrom

2. Stream Information –
Name, catalog number, section, county: Sandy Creek, **VIAA660,** Garfield County
Upstream range of native trout (general description and GPS):
Near confluence of headwater forks at **120364114** E, **4195057** N (see map)
Downstream range of native trout (general description and GPS):
Only **3** trout observed at the headwater site listed above.
Location (GPS) and description of barriers:
Natural de-watering just below Site **1** (see map).
Stream length – Occupied habitat: **> 0** Available habitat: about **2.4** km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc):
Gasoline power backpack elecro-fisher
Survey sites (general description and **UTM) :**
Site **1:** Near lower stream above Sandy Fields (see map) at **120365925** E, **4194582** N
Site **2:** About **1.6 km** upstream from lower site at **120364535** E, **4194651** N

Parameter	Site 1	Site 2	Site 3	Site **4**
Length of station (meters)	**0.4 km**	**0.4 km**		
Mean stream width (meters) (n)				
Station area (hectares)				
Number of fish 1'' pass	**0** fish	**0** fish		
Number of fish 2nd pass				
Population estimate (95% CI)				
Species and mean length **(mm) (n)**				
Species and mean weight (g) **(n)**				
Number of fish per **km**				
Number of fish per hectare				
Biomass (kg) per km				
Biomass (kg) per hectare				

4. Comments – No fish were collected in either site sampled. However, **2** adult and **1** yearling trout were observed further upstream (see map). Fish observations show some survival and reproduction since the **1999** transplant of CTBV (from Deep Creek). Sandy Creek, nevertheless, has very marginal trout habitat. Lack of pools and low flows limit trout habitat and may not allow CTBV to become established in this stream. More time will be needed to evaluate **success/failure** of this transplant.



Name: LITTLE CREEK PEAK
Date: 10/28/2002
Scale: 1 inch equals 2000 feet

Location: 12 364585 E 4194866 N
Caption: Sandy Creek, Garfield County, native cutthroat trout survey.

Birch Creek – NATIVE **TROUT** POPULATION **SURVEY** FORM

1. General Information – Date: 30 July through 21 August, 2001
Biologist: **Whelan**

2. Stream Information –

Name, catalog number, section, county: Birch Creek, **VI** AB 050 A2, Beaver County

Upstream range of native trout (general description and GPS): Upstream to confluence of North and South Forks at **120369416E, 4230733N.**

Downstream range of native trout (general description and GPS): Downstream where flows diminish and become too warm for trout at **120364581E, 4230181N.**

Location (GPS) and description of barriers: Barrier constructed at **120361868E, 4231468N** to prevent possible upstream migration of nonnative trout during high flows.

Stream length – Occupied habitat: 5.5 **km** Available habitat: 5.5 km *

3. Survey Site Information (attach map and field survey form) –

Survey method and **equipment** (gas, battery, **settings,** block nets, etc): Backpack **electro-**shocker, **Cofflet** at Site 3 and **SmithRoot** at Sites 2 and **1.** No block nets.

Survey sites (general description and UTM):

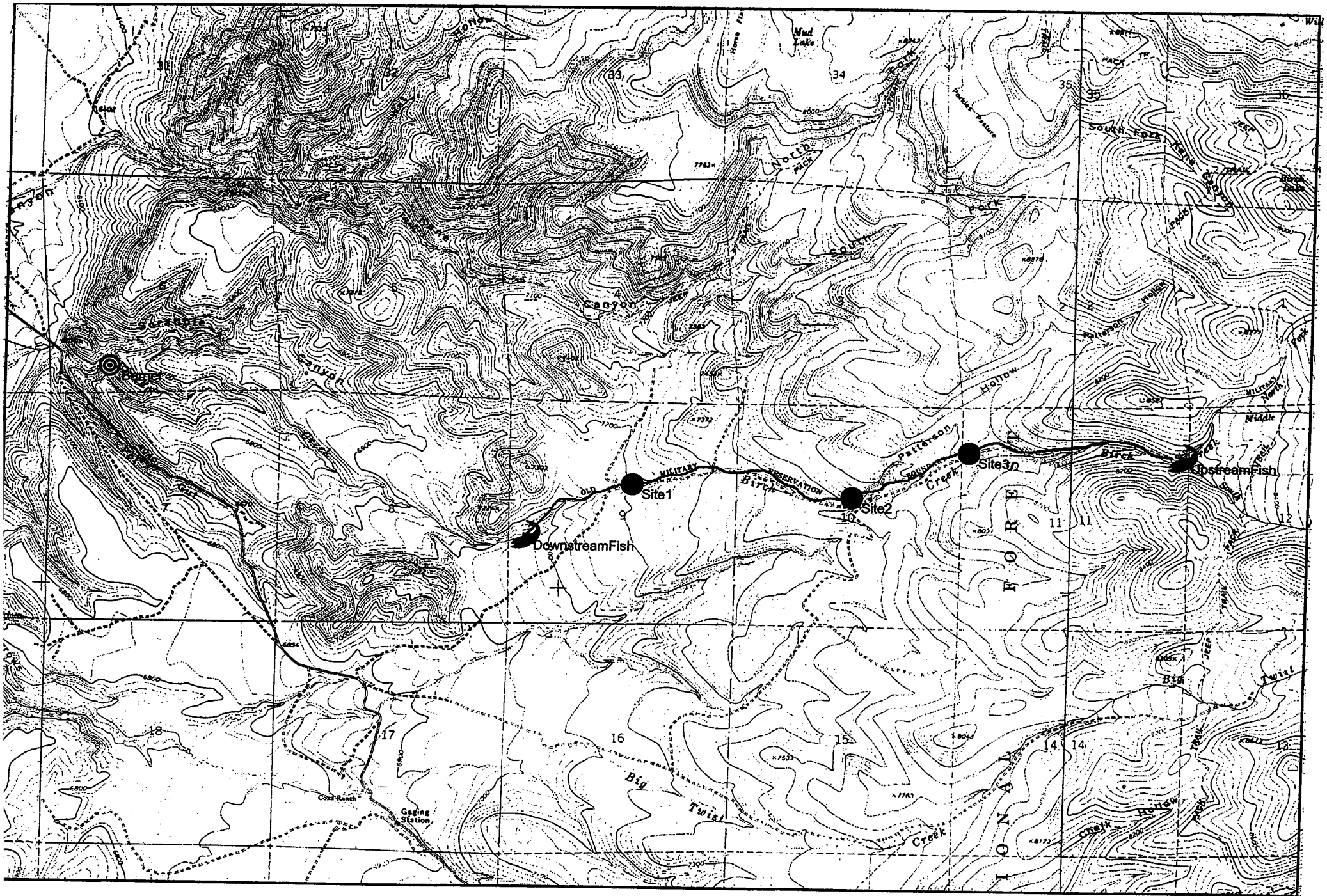
Site 1: Upstream from road access on BLM lands at **120365576E, 4230603N.**

Site 2: Where road comes near stream on **Forest** lands at **120367036E, 4230443N.**

Site 3: Upstream end of vehicle access at **120367974E, 4230804N.**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)	1.2 m	**1.1** m	1.3 m	
Station area **(hectares)**	0.013 ha	0.011 ha	0.013 ha	
Number of fish 1" pass	0 CTBV	3 CTBV	**6 CTBV**	
Number of fish **2nd** pass	0	4 on **2nd**, 1 on **3rd**	**1** CTBV	
Population estimate (95% CI)	0	**8 (± 1)**	**7 (± 1)**	
Species and mean length (mm) (n)	--	**CTBV 145 mm (8)**	**CTBV 140 mm (6)**	
Species **and** mean weight (g) **(n)**	–	**CTBV 33 g (8)**	**CTBV 32 g (6)**	
Number of fish **per km**	**0**	**80 CTBV**	**70 CTBV**	
Number of fish per hectare	0	727 **CTBV**	538 **CTBV**	
Biomass (kg) per km	**0 kg** per **km**	2.6 kg per km	2.2 **kg** per **km**	
Biomass (kg) per hectare	**0 kg** per ha	24.0 kg per ha	**17.2** kg per km	

4. Comments – Small stream. *Length of occupied habitat and standing crops of trout vary depending on high and low water cycles. Trout were found further downstream in the 1994 survey. Station 3 had a lower biomass in **2001** than in any previous survey. Biomass at stations 1 and **2** were also lower than the 1994 survey, but had ranged in the past from **0** to 56 and **0** to 99 kg per ha, respectively.



Name: KANE CANYON
Date: 12/11/2002
Scale: 1 inch equals 2857 feet

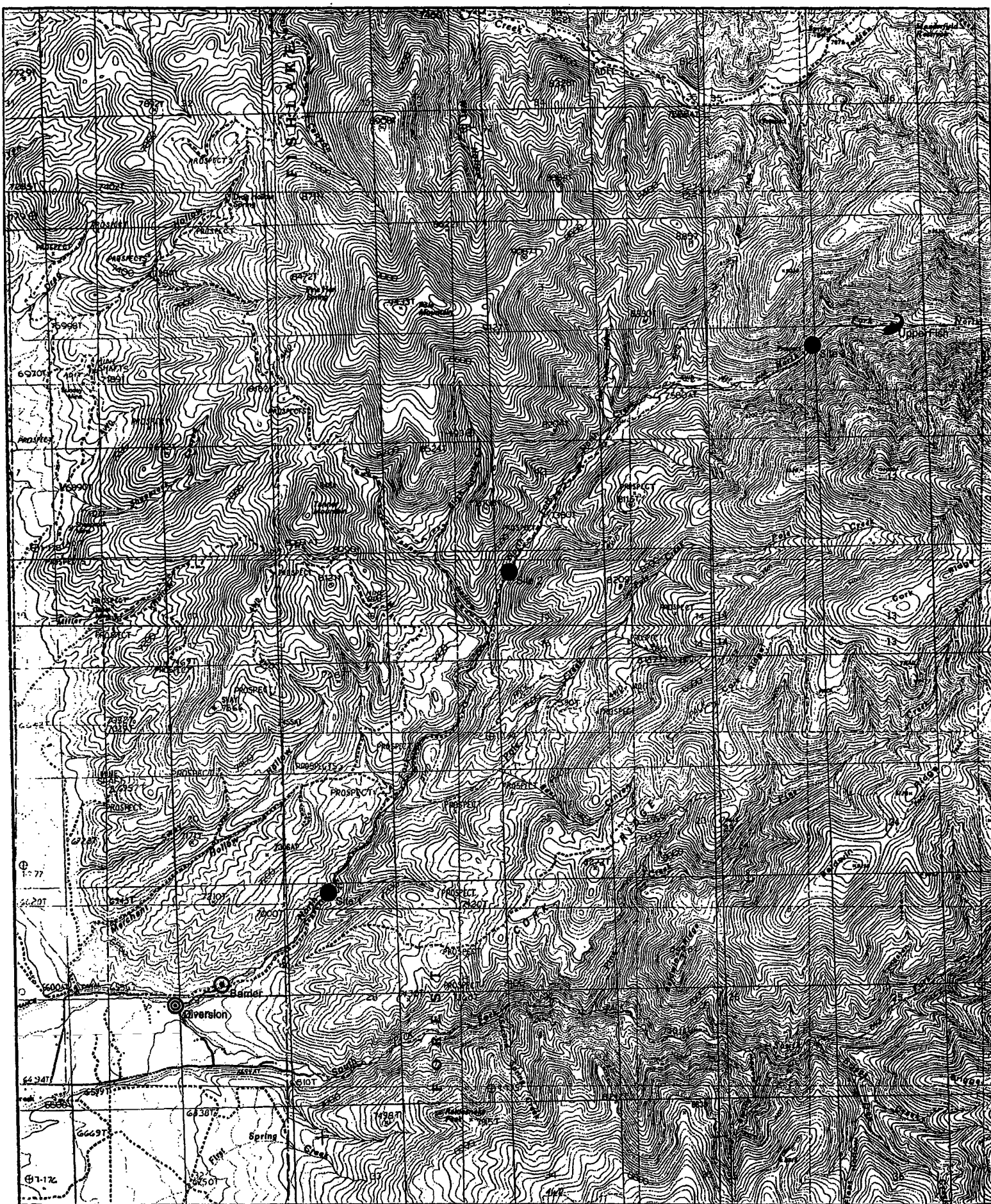
Location: 12 365734 E 4230840 N
Caption: Birch Creek, Beaver County, native cutthroat trout survey.

North Fork North Creek -- NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: **24-25** June **2002**
   Biologist: Whelan
2. Stream Information –
   Name, catalog number, section, county: North Fk North Creek, **VIAB070A,** Beaver County
   Upstream range of native trout (general description and GPS):
   About **12** km upstream from barrier at **120370703** E, **4251001** N (see map)
   Downstream range of native trout (general description and GPS):
   Migration barrier at **120364405** E, **4245090** N (see map)
   Location (GPS) and description of barriers:
   Barrier constructed at location noted above (also, see map).
   Stream length – Occupied habitat: **12.3** km Available habitat: **12.3** km
3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc):
   Battery power, backpack electro-shocker
   Survey sites (general description and **UTM**) :
   Site 1: Near first road crossing upstream from barrier at **120365388** E, **4245901N**
   Site **2:** About **0.6** km upstream from Tanner Hollow at **120367133** E, **4248798** N
   Site 3: Just upstream from Prospect (see map) at **120369978** E, **4250826** N

Parameter	Site **1**	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)	2.4 m	2.7 m	2.6 m	
Station area (hectares)	0.024 ha	0.027 ha	0.026 ha	
Number of fish 1st pass	30 CTBV	25 CTBV	14 CTBV	
Number of fish 2nd pass	18 CTBV	5 CTBV	3 CTBV	
Population estimate (95% CI)	74 (± 26)	31 (± 2)	18 (± 1)	
Species and mean length (mm) (n)	100 mm (48)	136 mm (30)	120 mm (17)	
Species and mean weight (g) (n)	17 g (48)	30 g (30)	27 g (17)	
Number of fish per km	740 per km	310 per km	180 per km	
Number of fish per hectare	3,083 per ha	1,148 per ha	692 per ha	
Biomass (kg) per km	12.6 kg per km	9.3 kg per km	3.9 kg per km	
Biomass (kg) per hectare	52 kg per ha	34 kg per ha	19 kg per ha	

4. Comments – Stream generally lacks good quality pools. Trout in the lower stream were recently shown to slightly exceed **10%** introgression, while trout in the upper stream were **< 10% introgressed.**



Name: POLE MT
Date: 10/24/2002
Scale: 1 inch equals 3636 feet

Location: 12 367075 E 4248497 N
Caption: North Fork North Creek, Beaver County, native cutthroat trout survey

Pole Creek -- NATIVE TROUT POPULATION SURVEY FORM

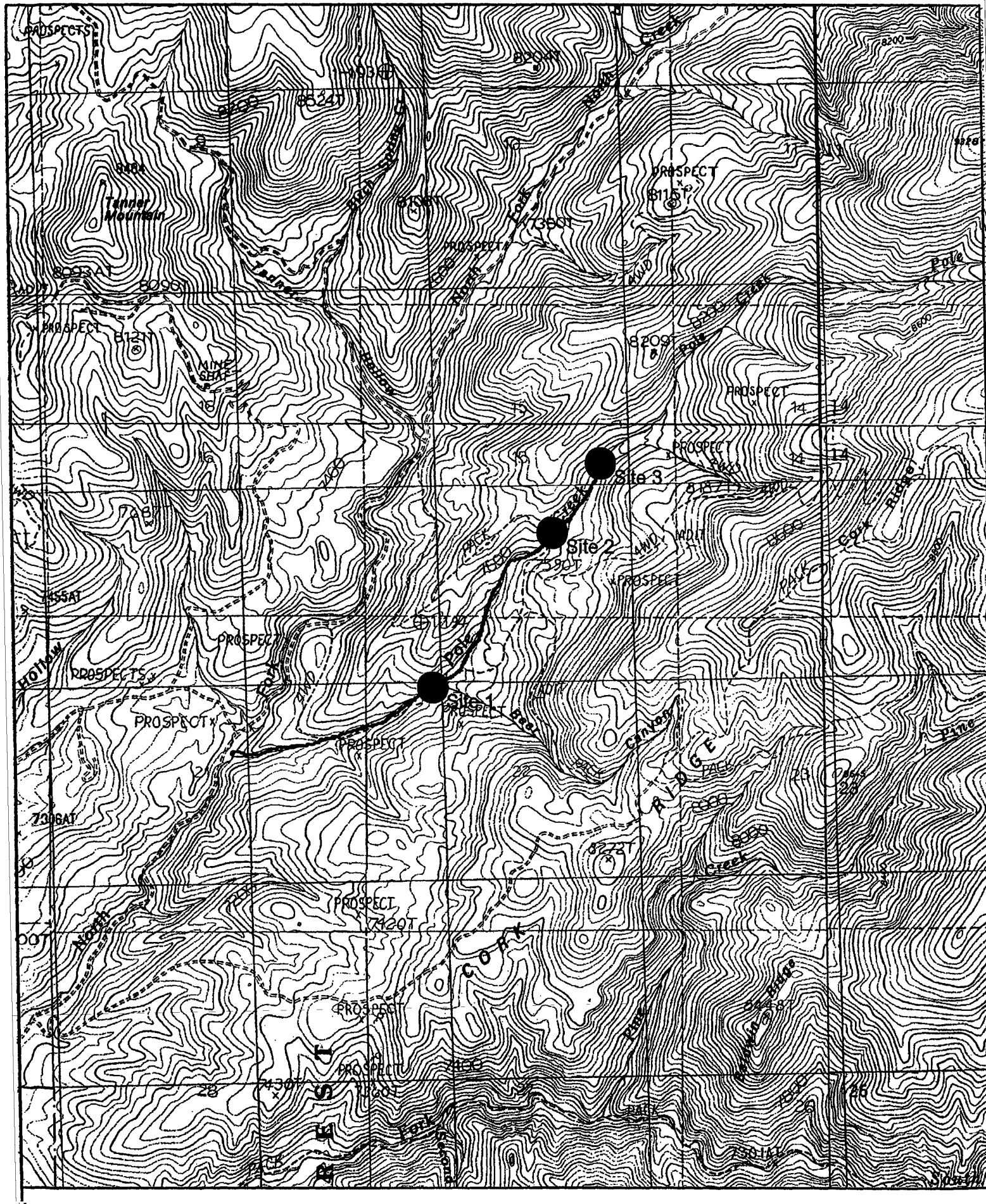
1. General Information – Date: 2 July 2002
Biologist: Whelan

2. Stream Information –
Name, catalog number, section, county: Pole Creek, VIAB070A01, Beaver County
Upstream range of native trout (general description and GPS):
Site 2 (see map) at 120367598 E, 4247757 N (fish stranded in isolated pools)
Downstream range of native trout (general description and GPS):
Most of the stream was intermittent, fish were stranded in a few isolated pools
Location (GPS) and description of barriers:
Pole Creek is a tributary to the N. Fk. North Creek
Stream length – Occupied habitat: > 0 Available habitat: 3.2 km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc):
Visual observations (stream was almost dry and electro-shocking was not feasible)
Survey sites (general description and UTM):
Site 1: Bear Canyon confluence at 120366949 E, 4246966 N
Site 2: 4-wheel trail access at 120367598 E, 4247757 N
Site 3: Headwater forks at 120367856 E, 4248099 N

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)				
Mean stream width (meters) (n)				
Station area (hectares)				
Number of fish 1" pass				
Number of fish 2" pass				
Population estimate (95% CI)	Stream almost dry at this site	2 fish observed in isolated pools	Intermittent flows and isolated pools but no fish were observed	

4. Comments – Stream was drought impacted. Most of the stream was dry or intermittent. Electro-shocking was not conducted but visual observations were made. Only 2 fish were observed at Site 2. Some flows also occurred at Sites 1 and 3, but there were few holding pools for fish. This stream has supported wild trout over multiple years in the past.



Name: BLACK RIDGE
Date: 12/11/2002
Scale: 1 inch equals 2000 feet

Location: 12 367319 E 4247432 N
Caption: Pole Creek. Beaver County, native cutthroat trout survey. Tributary to North Fork North Creek.

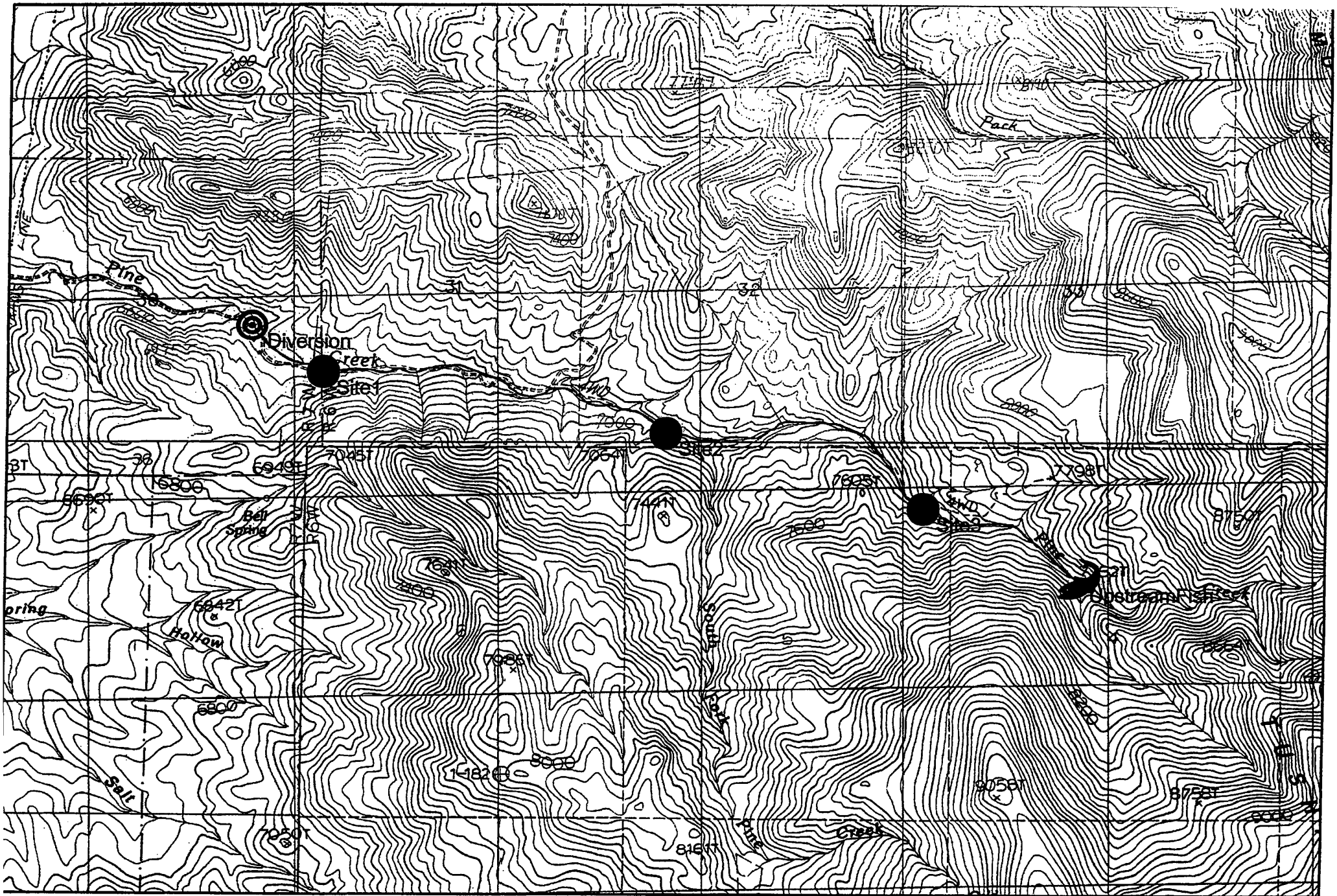
Pine Creek – NATIVE TROUT POPULATION **SURVEY** FORM

1. General Information – Date: 26 July through 7 August, 2001
   Biologist: **Whelan**
2. Stream Information –
   Name, catalog number, section, county: Pine Creek, VI AB 010 B, Beaver County
   Upstream range of native trout (general description and GPS): Near confluence with headwater fork at 1203658513, **4261521N.**
   Downstream range of native trout (general description and GPS): Irrigation diversion at **120361805E, 4262843N.**
   Location (GPS) and description of barriers: Lower stream naturally isolated by desert environment, and further isolated by irrigation diversion.

   Stream length – Occupied habitat: 5.0 **km** Available habitat: 5.0 km
3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc): Backpack electro-shocker with block nets.
   Survey sites (general description and UTM):
   Site 1: Near Forest boundary at **0365158E, 4261846N**
   Site 2: Just upstream from confluence with South Fork, at **0363887E, 4262501N**
   Site 3: Headwaters where 4-wheel drive road leaves stream at **0362205E, 4262625N**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)	1.9 m	1.7 m	1.9 m	
Station area (hectares)	**0.019 ha**	0.017 ha	0.019 ha	
Number of fish 1st pass	18 **CTBV**	16 CTBV	19 **CTBV**	
Number of fish 2"" pass	5 **CTBV**	6 **CTBV**	6 CTBV	
Population estimate (95% CI)	25 (± 1)	25 (± 4)	27 (± 3)	
Species and mean length **(mm) (n)**	**CTBV** 137 mm (23)	**CTBV** 106 mm (16)	CTBV 108 mm (22)	
Species and mean weight **(g) (n)**	**CTBV 30 g (23)**	**CTBV 13 g (16)**	**CTBV 15 g (22)**	
Number of fish per km	250 CTBV	250 CTBV	270 CTBV	
Number of fish per hectare	1,316 **CTBV**	1,471 CTBV	1,421 **CTBV**	
Biomass (kg) **per km**	7.5 **kg** per **km**	3.3 **kg** per **km**	4.1 **kg** per **km**	
Biomass **(kg)** per hectare	39.5 **kg** per ha	**19.1 kg per ha**	**21.3 kg per ha**	

4. Comments – Possible habitat damage from grazing and adjacent road (7 crossing on Forest, 3 on private, and 1 on South Fork). Trout biomass was about identical to values measured in 1994 survey. Supplemental surveys in 2001 found fish to be larger and biomass to be greater in exclosures compared to other stream areas.



Name: POLE MT
Date: 12/11/2002
Scale: 1 inch equals 2000 feet

Location: 12 363841 E 4262187 N
Caption: Pine Creek, Beaver County, native cutthroat trout survey.

Briggs/Iron Creek -- NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: 29 July 2002
Biologist: Whelan and **Madsen**

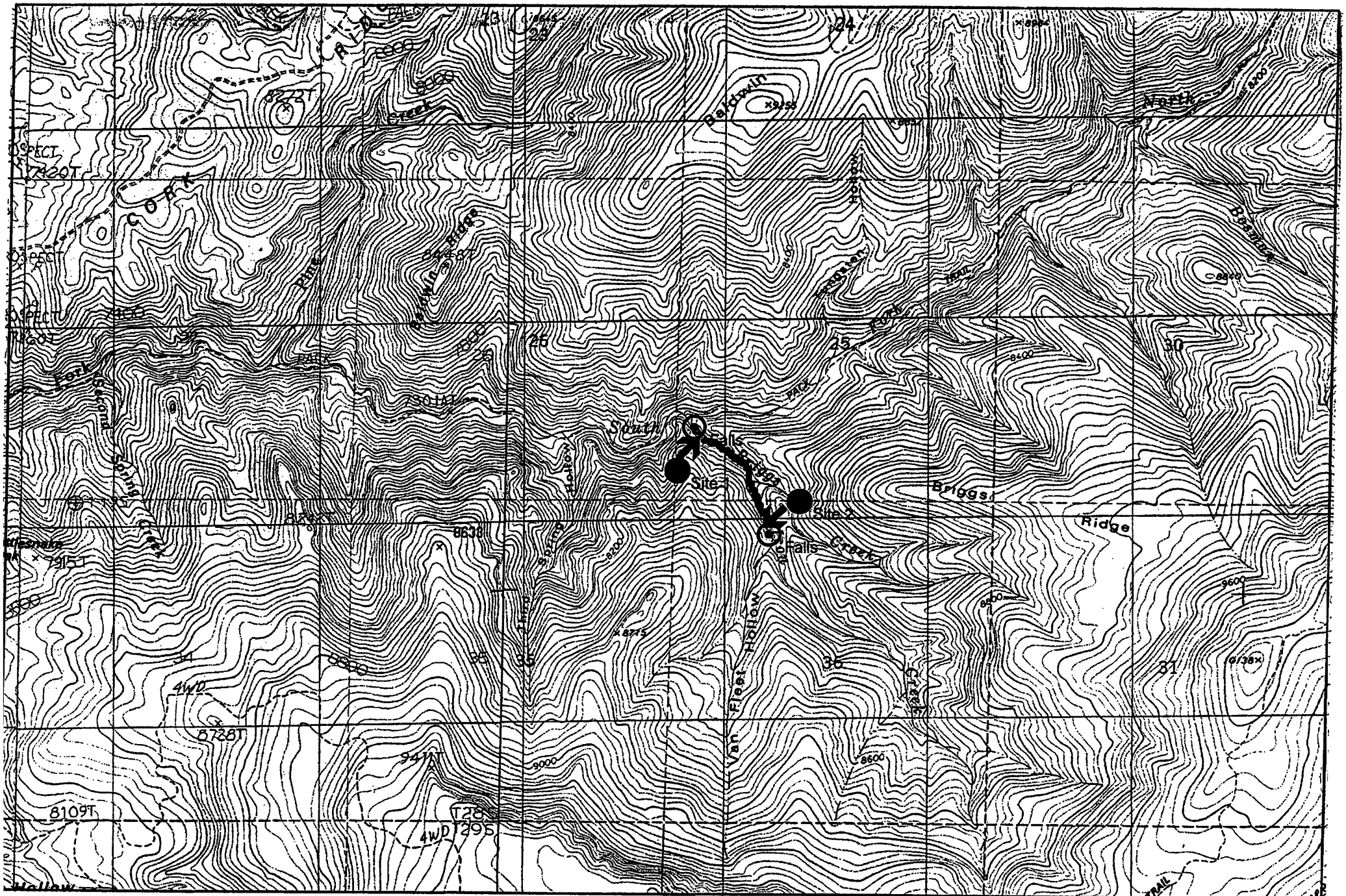
2. Stream Information –
Name, **catalog** number, section, **county: Briggs/Iron** Creek, **VIAB070B02,** Beaver County
Upstream range of native trout (general description and GPS):
Barrier waterfall at 120370236 E, 4243880 N (see map).
Downstream range of native trout (general description and GPS):
Barrier falls (confluence **S.Fk.** North Creek at 120369855 E, 4244446 N (see map).
Location (GPS) and description of barriers: As given above for range of fish.

Stream length – Occupied habitat: 0.9 km Available habitat: 0.9 km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Battery power backpack **electro-shocker.**
Survey sites (general description and UTM):
Site 1: Just above lower falls at 120369889 E, 4244405 N
Site 2: Just below upper falls at 120370236 E, 4243880 N
Site 3:

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m		
Mean stream width (meters) (n)	1.5 m	1.2 m		
Station area (hectares)	0.015 ha	0.012 ha		
Number of fish 1st pass	15 CTBV	8 CTBV		
Number of fish 2nd pass	2 CTBV	2 CTBV		
Population estimate (95% CI)	17 (± 1)	10 (± 1)		
Species and mean length (mm) (n)	138 mm (17)	161 mm (10)		
Species and mean weight (g) (n)	32 g (17)	45 g (10)		
Number of fish per km	170 per km	100 per km		
Number of fish per hectare	1,133 per ha	833 per ha		
Biomass (kg) per km	5.4 kg per km	4.5 kg pr km		
Biomass (kg) per hectare	36 kg per ha	37 kg per ha		

4. Comments – This small population of CTBV continues to survive in this fragmented section of stream.



Name: SHELLY BALDY PEAK
Date: 10/23/2002
Scale: 1 inch equals 2000 feet

Location: 12 369720 E 4244340 N
Caption: Briggs/Iron Creek, Beaver County, native cutthroat trout survey.

Reservoir Canyon -- NATIVE TROUT POPULATION **SURVEY** FORM

1. General Information – Date: 25 June 2002
Biologist: Chamberlain

2. Stream Information –

Name, catalog number, section, county: Reservoir Canyon, **IAA020C02A,** Washington Co.

Upstream range of native trout (general description and GPS): Confluence with seep from Bare Valley, see map.

Downstream range of native trout (general description and GPS): Intermittent pools downstream from Site 2, see map.

Location (GPS) and description of barriers: Barrier waterfalls upstream from confluence with Main Canyon, see map.

Stream length – Occupied habitat: 0.3 km Available habitat: 0.3 km (see comments)

3. Survey Site Information (attach map and field survey form) –

Survey method and equipment (gas, battery, settings, block nets, etc): Battery powered **electro-**shocker

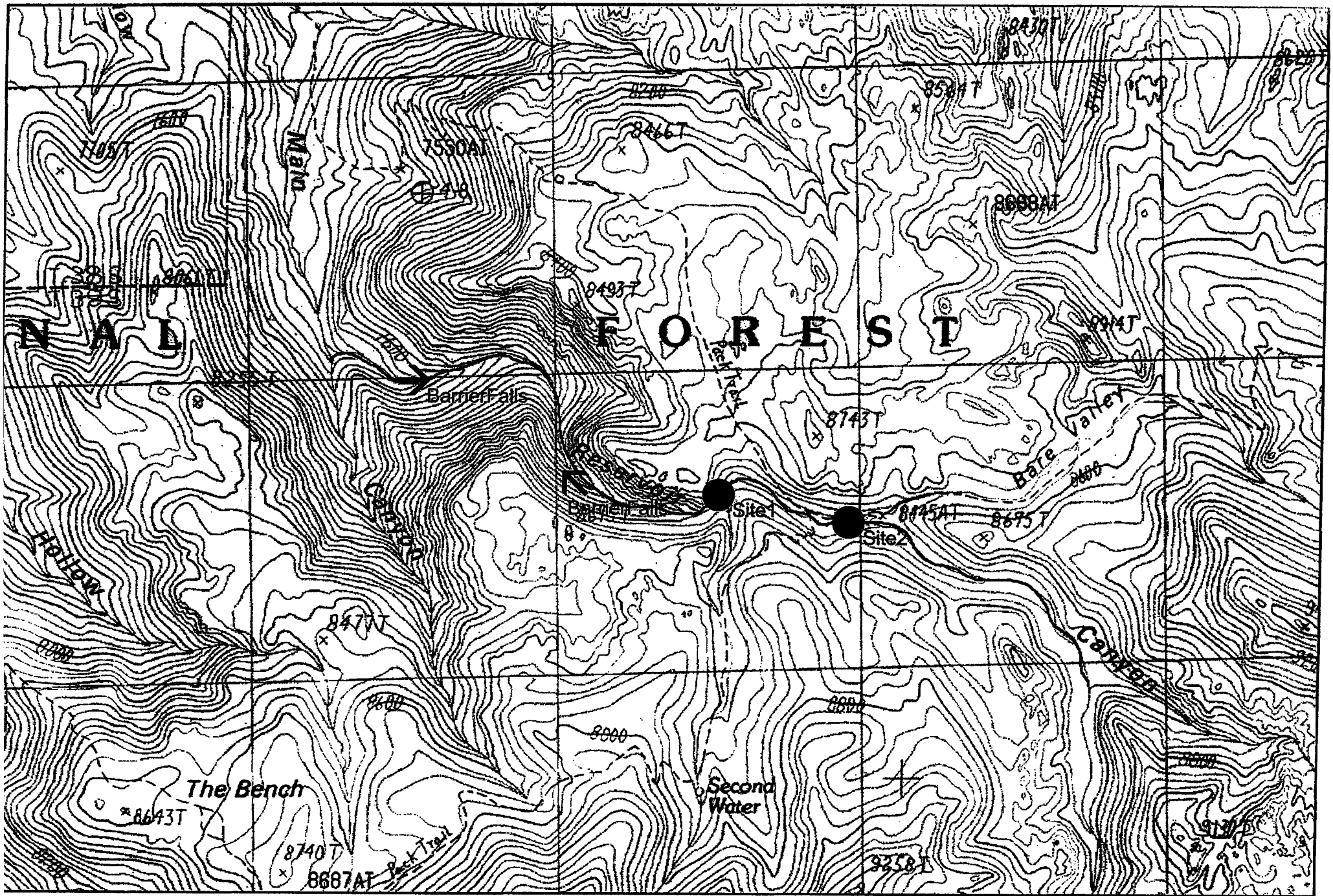
Survey sites (general description and UTM):

Site 1: About 600 m downstream from Bare Valley at 120285546 E, 4144574 N

Site 2: Confluence with seep from Bare Balley at 12028597 E, 4144471 N

Parameter	Site 1	Site **2**	Site 3	Site 4
Length of station (meters)		100 m		
Mean stream width (meters) **(n)**		0.9 m		
Station area (hectares)		0.009 ha		
Number of **fish** 1" pass		80 **CTBV**		
Number of fish **2nd** pass		**23 CTBV**		
Population estimate (95% CI)	4 trout in **intermittent** pools	**112 (± 11)**		
Species and mean length **(mm) (n)**		**129 mm (103)**		
Species and **mean** weight (g) **(n)**		**31 g (103)**		
Number of fish **per km**		1,120 per km		
Number of fish per hectare		**12,444 per ha**		
Biomass (kg) per km		35 kg per km		
Biomass (kg) per hectare		**386** kg per ha		

4. Comments – The stream was drought impacted, much of it being intermittent with fish surviving in isolated pools. Fish were very crowded in the small segment (about 300 m) of flowing stream.



Name: GRASS VALLEY
Date: 12/11/2002
Scale: 1 inch equals 1333 feet

Location: 12 285361 E 4144736 N
Caption: Reservoir Canyon Creek, Washington County, native cutthroat trout survey.

Water Canyon – NATIVE TROUT POPULATION SURVEY FORM

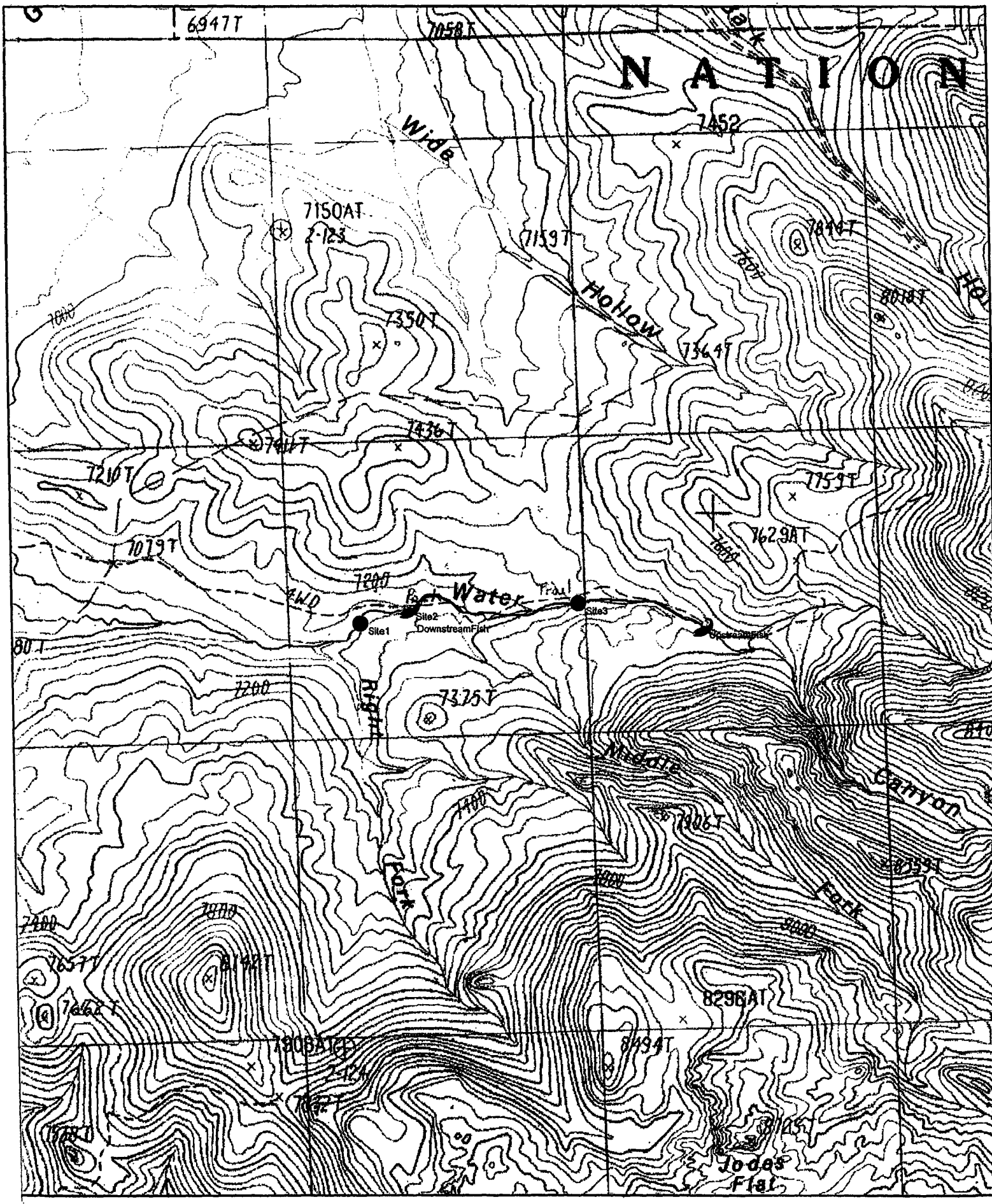
1. General Information – Date: 25 July, 2001
Biologist: Ottenbacher

2. Stream **Information –**
Name, **catalog** number, section, **county:** Water Canyon I **AA** 020 C 1, Washington
Upstream range of native trout (general description and GPS): About 560 m upstream from wilderness area trail head where the stream forks at **12282445E, 4143315N**
Downstream range of native trout (general description and GPS): About 240 m upstream from access road crossing at **12281527E, 4143462N**
Location (GPS) and description of barriers: Naturally de-watered stream channel at about **12280272E, 4143422N**
Stream length – Occupied habitat: 1.2 **km** Available habitat: 2.0 km *

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc):
Backpack gas electroshocker; no block nets
Survey sites (general description and UTM):
Site 1: About 250 m downstream from first crossing at **12281370E, 4143431N**
Site 2: Upstream from first crossing along access road at **12281458E, 4143460N**
Site 3: Trail head to wilderness area at **12281994E. 414347N**

Parameter	Site 1	Downstream end of fish (Site 2)	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	
Mean stream width (meters) (n)			1.3 m (10)	
Station area (hectares)			0.013 ha	
Number of fish 1st pass			28 **CTBV**	
Number of fish 2nd pass			6 **CTBV**	
Population estimate (95 % CI)	No fish	No fish	35 **(± 2)**	
Species and mean length **(mm) (n)**			**CTBV** 104 mm (34)	
Species and mean weight **(g) (n)**			**CTBV 16g (34)**	
Number of fish per km			350 **CTBV**	
Number of fish per hectare			2,692 **CTBV**	
Biomass per **km (kg)**			5.6 **kg** per **km**	
Biomass per **hectare (kg)**			43.1 **kg** per ha	

4. Comments – Very small stream. Available habitat varies depending on wet and dry cycles.



Name: GRASS VALLEY
Date: 12/11/2002
Scale; 1 inch equals 1333 feet

Location: 12 281733 E 4143450 N
Caption: Water Canyon Creek, Washington County, native cutthroat trout survey.

Leap Creek – NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: May 2 and 14,2002
Biologist: Hepworth, Chamberlain, and Ottenbacher

2. Stream **Information** –

Name, catalog number, section, county: Leap Creek, I AA 060 B, Washington County

Upstream range of native trout (general description and GPS): Above confluence of Brush Creek at: **120293112E, 4143017N.**

Downstream range of native trout (general description and GPS): Where surface flows became depleted and too warm for **trout: 120295763E, 4139591N**

Location (GPS) and description of barriers: Irrigation diversion at: **120296996E, 4139665N.**

Stream length – Occupied habitat: 5.3 **km** Available habitat: 5.3 km

3. Survey Site Information (attach map and field survey form) –

Survey method and equipment (gas, battery, settings, block nets, etc): Backpack electroshocker

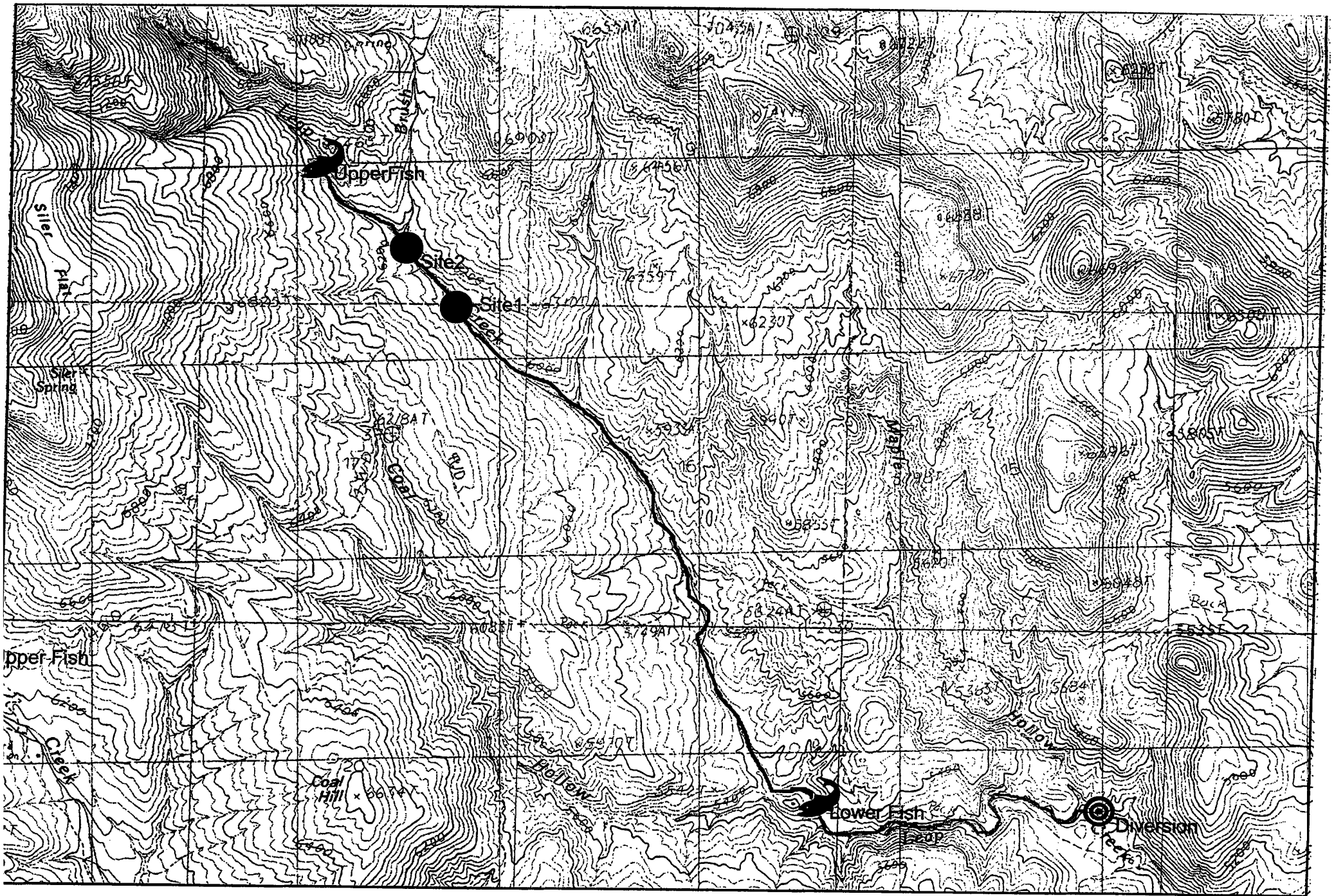
Survey sites (general description and UTM):

Site 1: Downstream **0.5** km from Brush Creek: **120293773E, 4142280N**

Site 2: At confluence with Brush Creek: **120293535E, 4142565N**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	**100** m		
Mean stream width (meters) (n)	1.1 m	1.4 m		
Station area (hectares)	0.011 ha	0.014 ha		
Number of fish 1st pass	15 **CTBV**	9 CTBV		
Number of fish 2nd pass	5 CTBV	**1** CTBV		
Population estimate (95% CI)	22 (± 3)	**10** (± 0)		
Species and mean length **(mm) (n)**	108 mm (20)	138 mm (10)		
Species and mean weight (g) **(n)**	**19 g (20)**	**39 g (10)**		
Number of fish per lan	220 per km	100 per km		
Number of fish per hectare	2,000 per ha	714 per ha		
Biomass **(kg)** per lan	4.2 kg per km	3.9 kg per km		
Biomass (kg) per hectare	38.0 kg per ha	27.9 kg per ha		

4. Comments – **Limited** stream flows. Volume of water increased downstream from the confluence of an unnamed tributary (about **1.0** km downstream from survey Site 1). Fish densities appeared to increase (visual observation) downstream from this point, but another site survey was not conducted in this area because of the **difficult** access.



Name: NEW HARMONY
Date: 12/11/2002
Scale: 1 inch equals 2000 feet

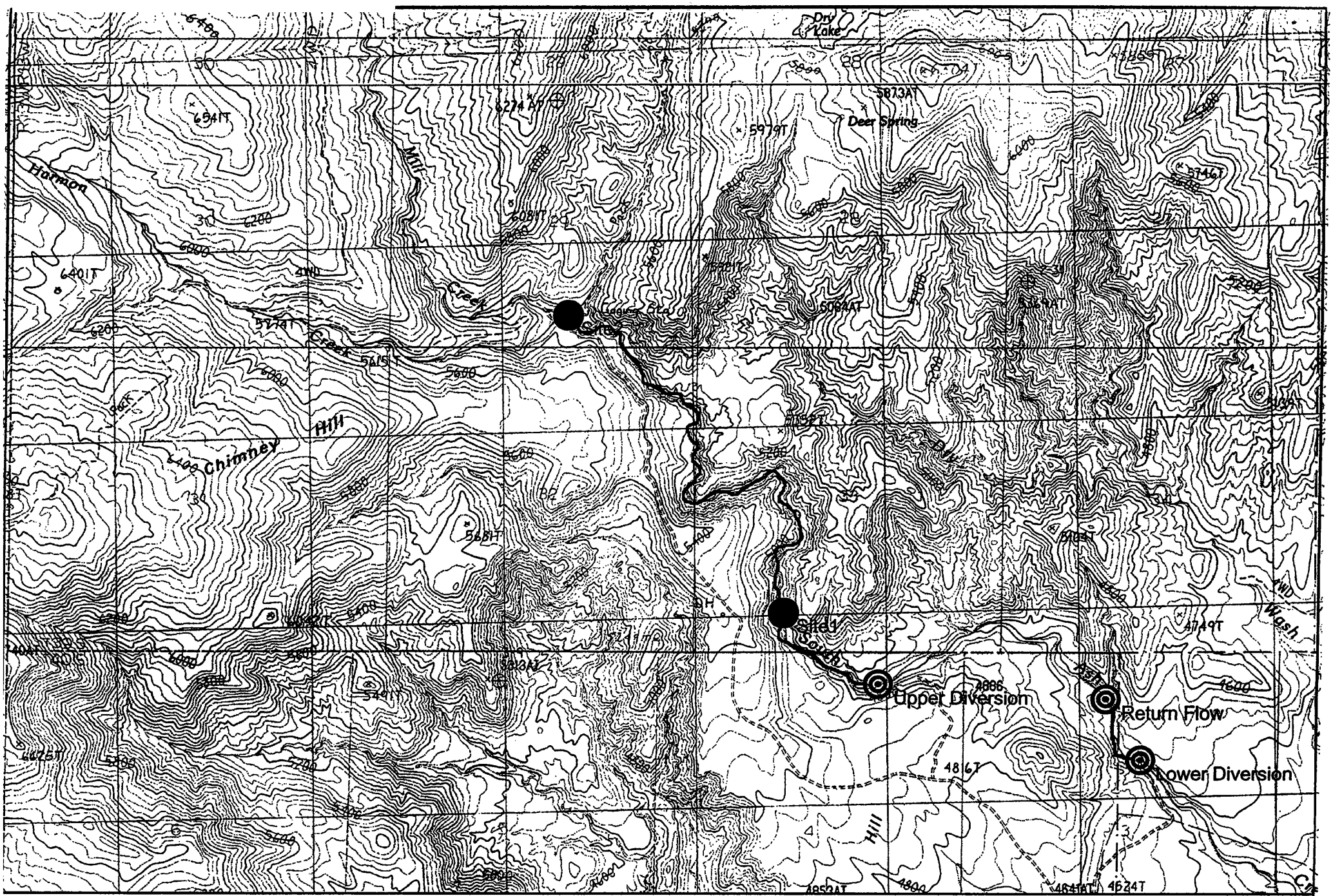
Location: 12 294818 E 4141513 N
Caption: Leap Creek, Washington County, native cutthroat trout survey.

South Ash Creek – NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: 20 May, 2002
   Biologist: Hepworth, Chamberlain, and Ottenbacher
2. Stream Information –
   Name, catalog number, section, county: South Ash Creek, I AA 060 A, Washington County
   Upstream range of native trout (general description and GPS): Stream splits into Harmon and Mill creeks at: **120293299E, 4137603N**
   Downstream range of native trout (general description and GPS): Where stream ends at lower irrigation diversion: **120296322E, 4135191N**
   Location (GPS) and description of barriers: Lower and upper irrigation diversions function as upstream migration barriers, located as shown on map.
   Stream length – Occupied habitat: 7.1 km Available habitat: 7.1 km
3. Survey Site Information (attach map and field survey form) –
   Survey method and equipment (gas, battery, settings, block nets, etc): Gasoline backpack electr-shocker.
   Survey sites (general description and UTM):
   Site 1: About 0.9 km upstream from upper irrigation diversion at: 1202945143, 4135918N
   Site 2: About 0.4 km downstream from confluence of Harmon and Mill creeks at 120293550E, 4137528N

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m		
Mean stream width (meters) (n)	2.5 m	2.2 m		
Station area (hectares)	0.025 ha	0.022 ha		
Number of fish 1st pass	37 CTBV	30 CTBV		
Number of fish 2nd pass	6 CTBV	7 CTBV		
Population estimate (95% CI)	44 (± 2)	39 (± 2)		
Species and mean length (mm) (n)	190 mm (43)	172 mm (37)		
Species and mean weight (g) (n)	66 g (43)	54 g (37)		
Number of fish per km	440 per km	390 per km		
Number of fish per hectare	1,760 per ha	1,773 per ha		
Biomass (kg) per km	29.0 kg per km	21.1 kg per km		
Biomass (kg) per hectare	115.2 kg per ha	95.7 kg per ha		

4. Comments – The stream section between the lower and upper irrigation diversion is put into a ditch and pipeline to prevent the stream from running sub-surface (see map). Although this is an artificial channel, it contains CTBV and is counted as part of the total occupied habitat.



Name: PINTURA
Date: 12/11/2002
Scale: 1 inch equals 2105 feet

Location: 12 293848 E 4136874 N
Caption: South Ash Creek, Washington County, native cutthroat trout survey.

Harmon Creek – NATIVE TROUT POPULATION SURVEY **FORM**

1. General Information – Date: 4 May, 2002
Biologist: Ottenbacher and Chamberlain

2. Stream Information –

Name, catalog number, section, county: Harmon Creek, I AA 060 A 1, Washington County

Upstream range of native trout (general description and GPS): About 3.0 km upstream from confluence with Mill Creek at: **120291161E, 4138109N**

Downstream range of native trout (general description and GPS): At stream confluence with Mill Creek (see map).

Location (GPS) and description of barriers: Natural barrier at upper end of fish distribution; CTBV transplanted above this site at time of survey.

Stream length – Occupied habitat: 3.0 **km** Available habitat: about 6.0 km

3. Survey Site Information (attach map and field survey form) –

Survey method and equipment (gas, battery, settings, block nets, etc): Gasoline backpack electro-shocker.

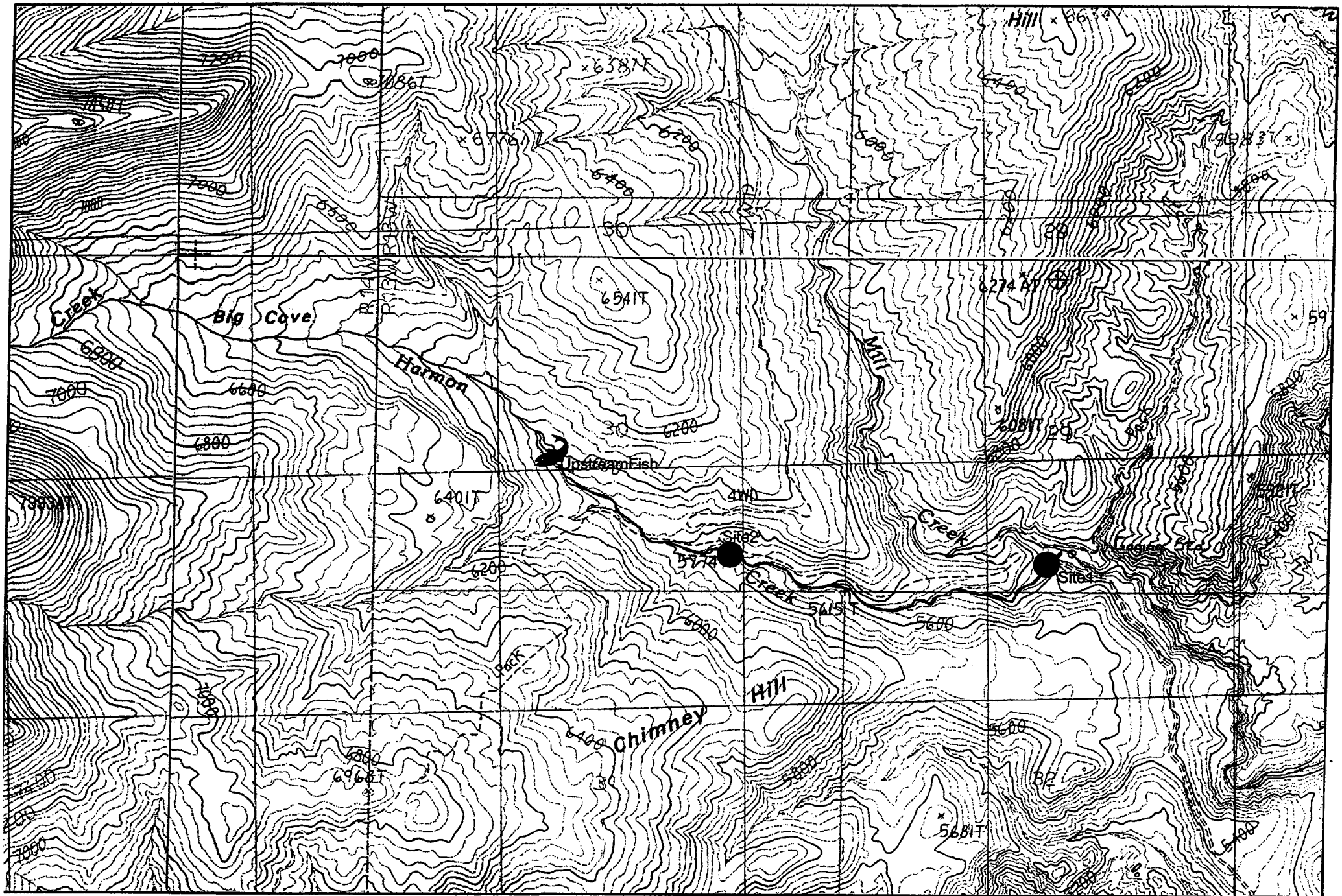
Survey sites (general description **and UTM) :**

Site 1: About 300 m upstream from confluence with Mill Creek at: 1202932183, **4137533N**

Site 2: Near where road leaves stream at: **120291909E, 4137667N**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m		
Mean stream width (meters) (n)	1.7 m	1.8 m		
Station area (hectares)	0.017 ha	0.018 ha		
Number of fish 1" pass	41 CTBV	20 **CTBV**		
Number of fish **2nd** pass	10 **CTBV**	3 **CTBV**		
Population estimate (95% CI)	54 **(+ 3)**	23 **(+ 0)**		
Species and mean length **(mm) (n)**	138 mm (51)	171 mm (23)		
Species and mean weight **(g) (n)**	**32 g (51)**	**64 g (23)**		
Number of fish per km	540 per km	230 per km		
Number of fish per hectare	3,176 per ha	1,278 per ha		
Biomass (kg) **per km**	17.3 kg per km	14.7 kg per km		
Biomass (kg) per hectare	**101.6** kgper ha	81.8 kgper ha		

4. Comments – Occupied stream length can be almost doubled by moving CTBV upstream above a small natural barrier, as noted under #2, above. Rainbow trout formerly occupied all of this area prior to native trout restoration.



Name: PINTURA
Date: 12/11/2002
Scale: 1 inch equals 1666 feet

Location: 12 291709 E 4138052 N
Caption: Harmon Creek, Washington County, native cutthroat trout survey.

Mill Creek – NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: May 4 and 11,2002
Biologist: Hepworth, Ottenbacher, and Chamberlain

2. Stream Information –

Name, catalog number, section, county: Mill Creek, I AA 060 A 2, Washington County

Upstream range of native trout (general description and GPS): Left **Fork:** 1202904443, **4140249N;** Middle **Fork: 120290945E, 4140860N;** Right Fork: **120291432E, 4140596N**

Downstream range of native trout (general description and GPS): At confluence with Harmon Creek (see map).

Location (GPS) and description of barriers: Natural upstream barriers on all three headwater forks.

Stream length – Occupied habitat: 8.0 km Available habitat: 8.0 km

3. Survey Site Information (attach map and field survey form) –

Survey method and equipment (gas, battery, settings, block nets, etc): Gasonline backpack electro-shocker

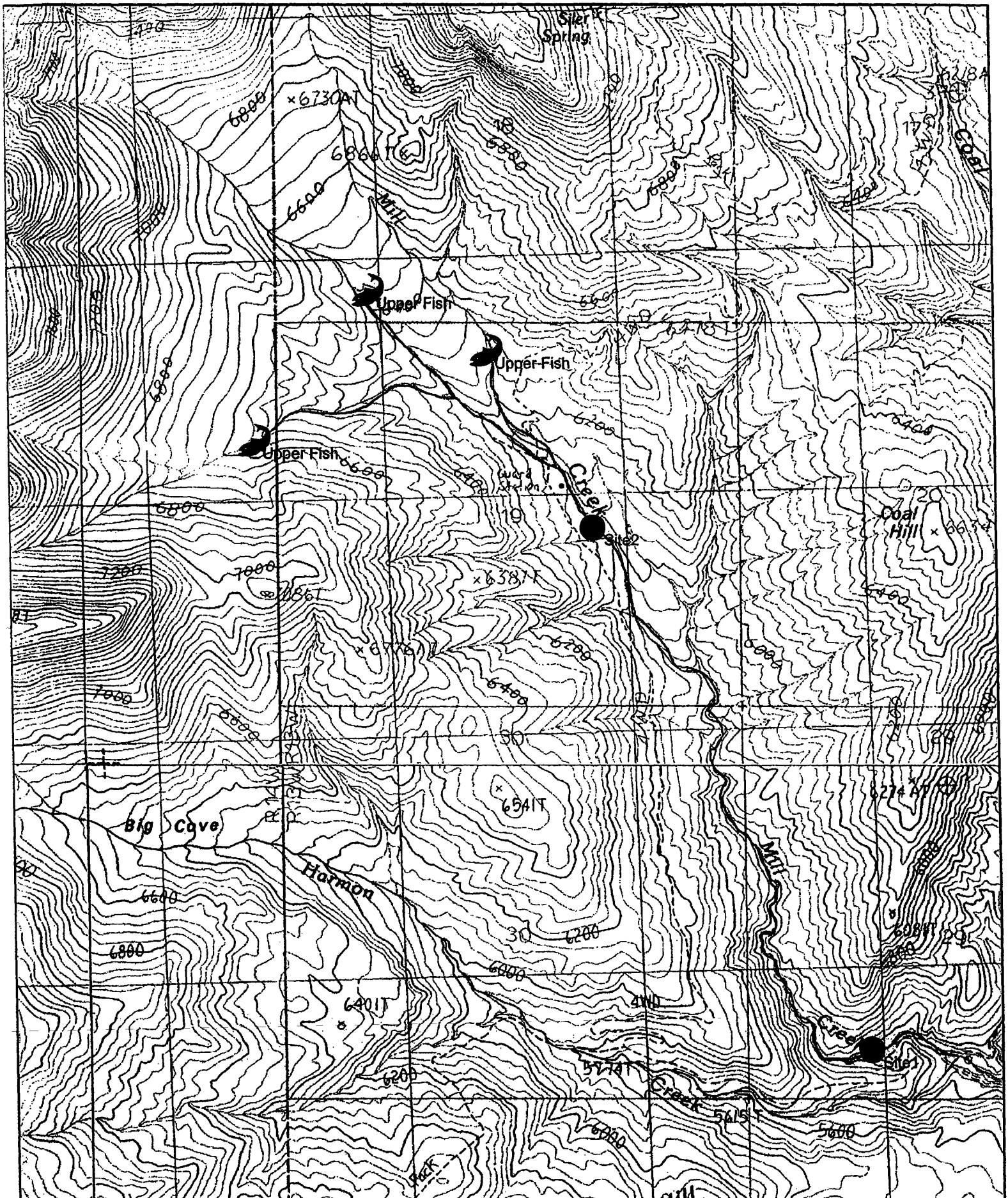
Survey sites (general description and UTM):

Site 1: About 0.6 km upstream from confluence with Harmon Creek at: **120292878E, 4137639N**

Site 2: Near Browse Guard Station at: **120291800E, 4139964N**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m		
Mean stream width (meters) (n)	2.2 m	2.3 m		
Station area (hectares)	0.022	0.023 ha		
Number of fish 1'' pass	29 CTBV	26 CTBV		
Number of fish 2nd pass	10 CTBV	10 CTBV		
Population estimate (95% CI)	44 (± 5)	42 (± 6)		
Species and mean length (mm) (n)	170 mm (39)	130 mm (36)		
Species and mean weight (g) (n)	52 g (39)	35 g (36)		
Number of fish per km	440 per km	420 per km		
Number of fish per hectare	2,000 per ha	1,826 per ha		
Biomass (kg) per km	22.9 kg per km	14.7 kg per km		
Biomass (kg) per hectare	104.0 kg per ha	63.9 kg per ha		

4. Comments – **All** three headwater forks support CTBV in upstream locations until water volume or barriers restrict populations. Because of natural barriers, CTBV were moved into upper sections of the headwater forks during 1995 or earlier.



Name: NEW HARMONY
Date: 12/1112002
Scale: 1 inch equals 1666 feet

Location: 12 291481 E 4139545 N
Caption: Mill Creek, Washington County, native cutthroat trout survey.

Leeds Creek -- NATIVE TROUT POPULATION **SURVEY** FORM

1. General Information – Date: 7 **March 2002**
Biologist: **Hepworth and Chamberlain**

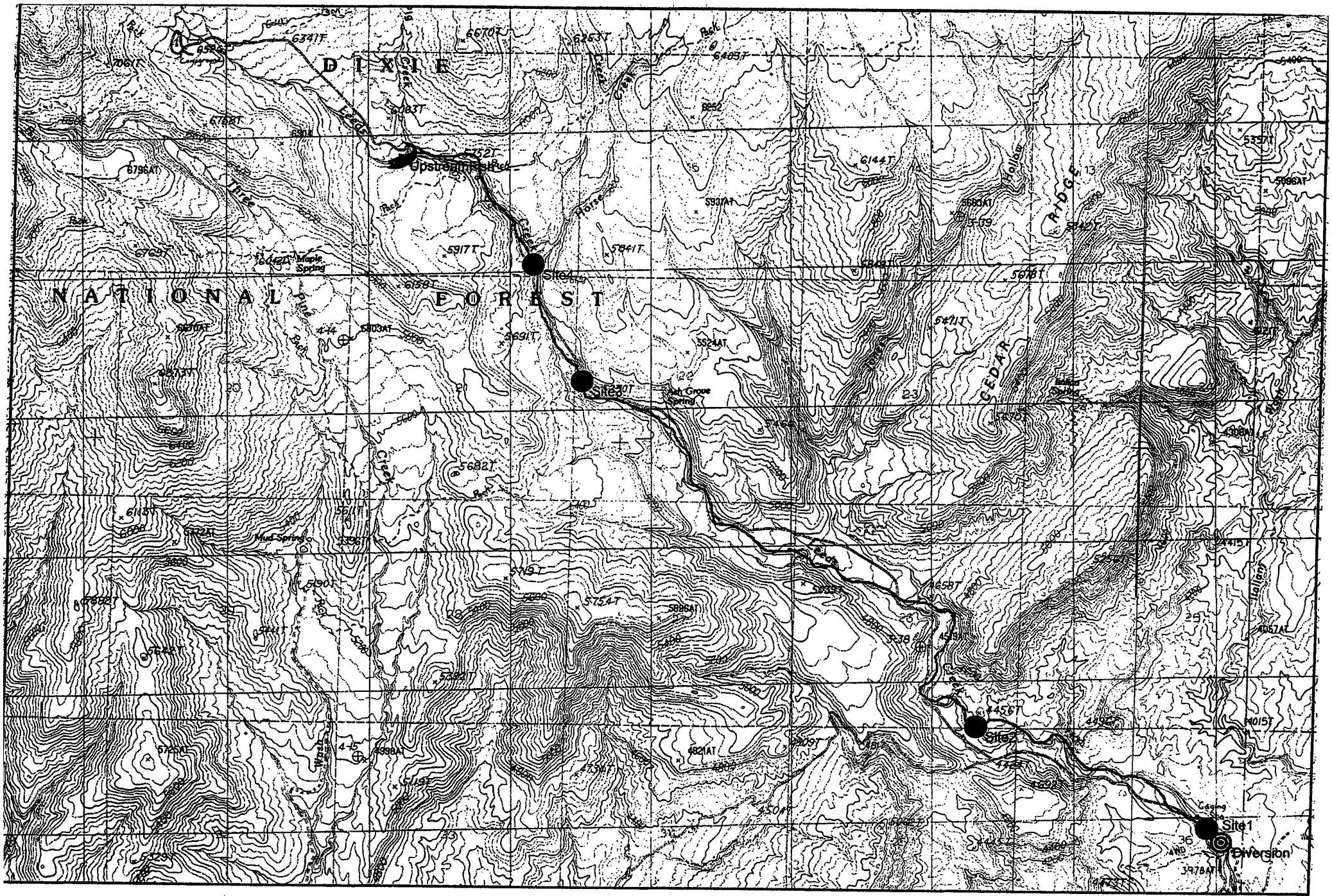
2. Stream Information –
Name, catalog number, section, county: **Leeds Creek, I AA 040, Washington County**
Upstream range of native trout (general description and GPS): **At confluence with Pig Creek (see map).**
Downstream range of native trout (general description and GPS): **At diversion near site 4 (see map). 120290045 E, 4126808 N.**
Location (GPS) and description of barriers: **Several natural upstream migration barriers along stream, as well as the diversion at the lower end near the Forest boundary.**

Stream length – Occupied habitat: **11.5 km** Available habitat: **11.5 km**

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): **Gasoline backpack electro-shocker**
Survey sites (general description and UTM):
Site 1: **Above diversion at 120289945 E, 4126890 N.**
Site **2: Below road crossing at 120288313 E, 4127661 N.**
Site **3: Above Ash Grove Spring at 120285506 E, 4130202 N.**
Site **4: Upstream from confluence with Spirit Creek at 120284229 E, 4131850 N.**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	100 m	100 m	100 m
Mean stream width (meters) (n)	1.6 m	2.5 m	2.3 m	2.1m
Station area (hectares)	0.016 ha	0.025 ha	0.023 ha	0.021 ha
Number of fish 1'' pass	15 CTBV	17 CTBV	32 CTBV	21 CTBV
Number of fish 2'' pass	2 CTBV	3 CTBV	3 CTBV	0 CTBV
Population estimate (95% CI)	17 (±1)	20 (±1)	35 (±1)	21 (± 0)
Species and mean length (mm) (n)	167 mm (17)	171 mm (20)	176 mm (35)	152 mm (21)
Species and mean weight (g) (n)	57 g (17)	55 g (20)	69 g (35)	55 g (21)
Number of fish per km	170 per km	200 per km	350 per km	210 per km
Number of fish per hectare	1,063 per ha	800 per ha	1,522 per ha	1,000 per ha
Biomass (kg) per km	9.7 kg per km	11.0 kg per km	24.2 kg per km	11.6 kg per km
Biomass (kg) per hectare	61 kg per ha	44 kg per ha	105 kg per ha	55 kg per ha

4. Comments – **CTBV colonized entire stream length since their introduction in 1989.**



Name: SIGNAL PEAK
Date: 12/11/2002
Scale: 1 inch equals 2857 feet

Location: 12 286108 E 4129705 N
Caption: Leeds Creek, Washington County, native cutthroat trout survey.

Pig Creek – NATIVE TROUT POPULATION **SURVEY** FORM

1. General **Information** – Date: **13** March **2002**
Biologist: Ottenbacher, Hepworth, and Chamberlain

2. Stream Information –
Name, catalog number, section, county: Pig Creek, I AA **040 D,** Washington County
Upstream range of native trout (general description and GPS): About **0.9 km** upstream from confluence with Leeds Creek at: **0284207E, 4132588N**
Downstream range of native trout (general description and GPS): Pig Ceek ends where it joins Leeds Creek (see map).
Location (GPS) and description of barriers: Upstream migration barrier at confluence with Leeds Creek, and multiple other natural barriers along the stream.

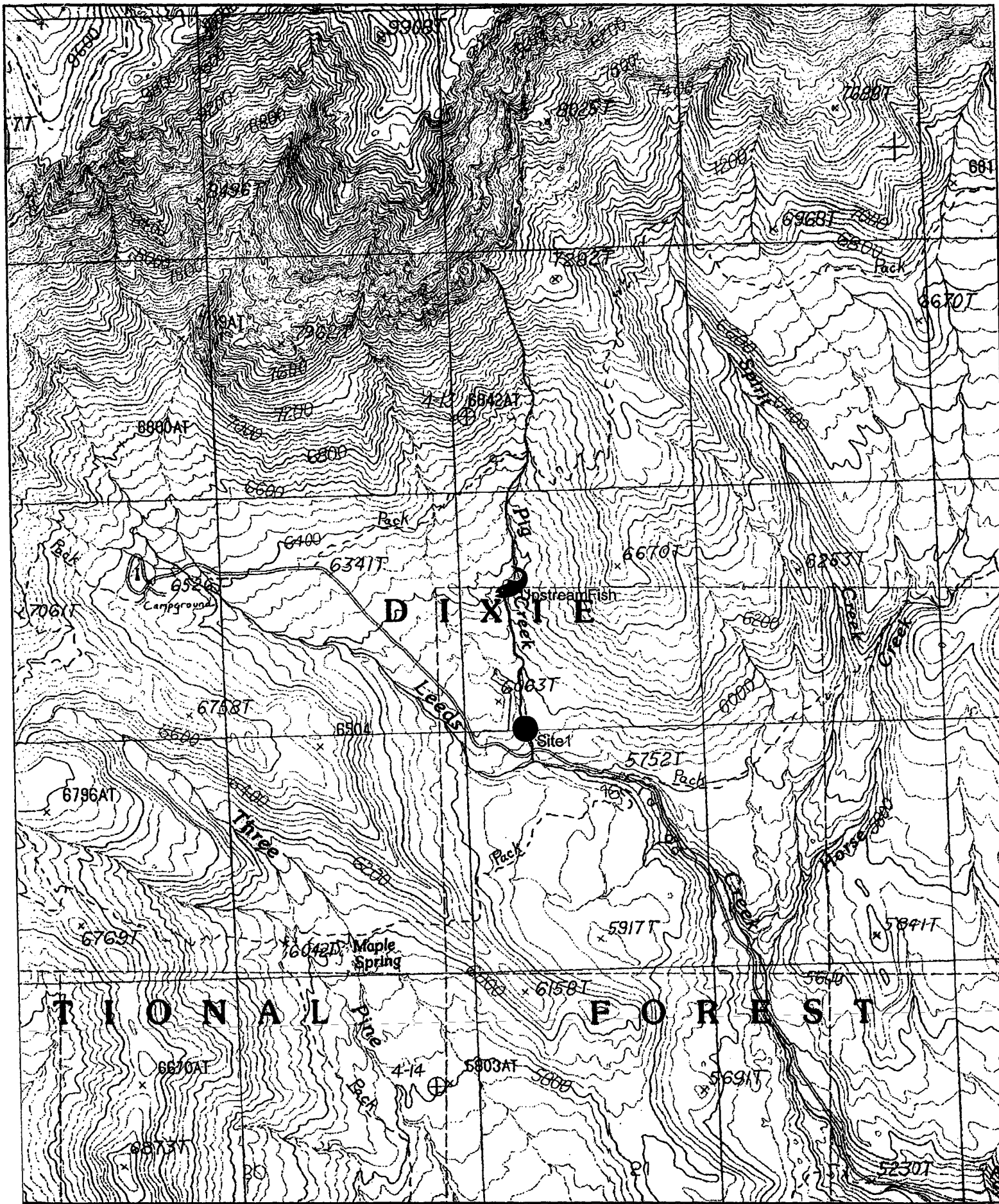
Stream length – Occupied habitat: **0.9** km Available habitat: **0.9** km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Gasoline backpack electro-shocker.

Survey sites (general description and UTM):
Site 1: About **0.2 km** upstream from confluence with Leeds Creek at: **02842573, 4131992N.**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m			
Mean stream width (meters) (n)	1.1 m			
Station area (hectares)	0.011 ha			
Number of fish 1st pass	4 CTBV			
Number of fish 2nd pass	0 CTBV			
Population estimate (95% CI)	**4 (± 0)**			
Species **and** mean length **(mm) (n)**	109 **nun** (4)			
Species **and** mean weight (g) **(n)**	**17 g (4)**			
Number of fish per km	40 per km			
Number of fish per hectare	364 per ha			
Biomass **(kg)** per km	0.7 **kg** per **km**			
Biomass (kg) per hectare	**6.2 kg** per **ha**			

4. Comments – Stream has been impacted by drought. Both numbers and upstream range of CTBV have been restricted since the **1995** survey.



Name: SIGNAL PEAK
Date: 12/11/2002
Scale: 1 inch equals 1666 feet

Location: 12 284208 E 4132525 N
Caption: Pig Creek. Washinaton County, native cutthroat trout survey. Tributary to Leeds Creek.

Spirit Creek -- NATIVE TROUT POPULATION **SURVEY** FORM

1. General Information – Date: 13 March, 2002
Biologist: **Hepworth,** Ottenbacher, and Chamberlain

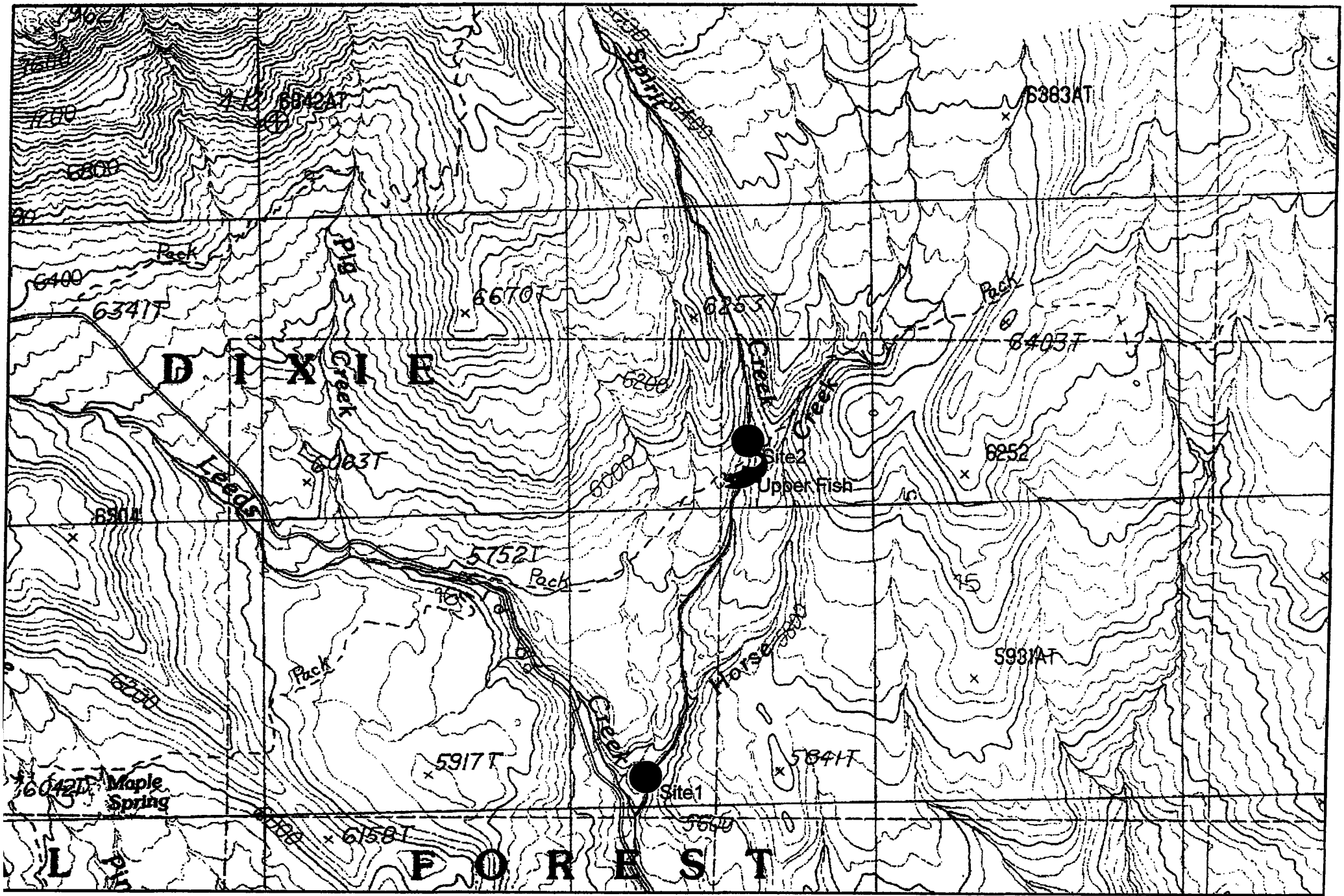
2. Stream Information –
Name, catalog number, section, county: Spirit Creek, I AA **040C,** Washington County
Upstream range of native trout (general description and GPS): Just below pack trail crossing at: **0285573E, 4132096N**

Downstream range of native trout (general description and GPS): Stream ends at confluence with Leeds Creek (see map).
Location (GPS) and description of barriers: Numerous natural upstream migration barriers along stream.
Stream length – Occupied habitat: 1.6 km Available habitat: 1.6 km

3. **Survey** Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Gasoline backpack electro-shocker
Survey sites (general description and UTM):
Site 1: About 0.1 km upstream from confluence with Leeds Creek at: 02852463, **4131032N**
Site 2: Upstream from pack trail crossing at: **0285597E, 4132179N.**

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	(no fish sampled)		
Mean stream width (meters) (n)	1.3 m			
Station area (hectares)	0.013 ha			
Number of fish I" pass	**11** CTBV			
Number of fish 2nd pass	**0 CTBV**			
Population estimate (95% CI)	11 **(± 0)**			
Species and mean length **(mm) (n)**	190 mm **(11)**			
Species and mean weight (g) **(n)**	**80 g (11)**			
Number of fish per km	**110 per km**			
Number of fish per hectare	846 per ha			
Biomass (kg) per km	8.8 kg per **km**			
Biomass **(kg)** per hectare	67.7 kg per ha			

4. Comments – Upper stream impacted by drought. Fish were known to occur at Site 2 as recently as 2000, but were found just below this area in this survey. Several springs along the lower stream have helped maintain the fish population in this area.



Name: SIGNAL PEAK
Date: 12/11/2002
Scale: 1 inch equals 1333 feet

Location: 12 285343 E 4132184 N
Caption: Spirit Creek, Washington County, native cutthroat trout survey. Tributary to Leeds Creek.

Horse Creek -- NATIVE TROUT POPULATION SURVEY FORM

1. General Information – Date: 13 March, 2002
Biologist: Hepworth, Ottenbacher, and Chamberlain

2. Stream Information –
Name, catalog number, section, county: Horse Creek, I AA 040 C 01, Washington County
Upstream range of native trout (general description and GPS): About 0.8 km upstream from confluence with Spirit Creek

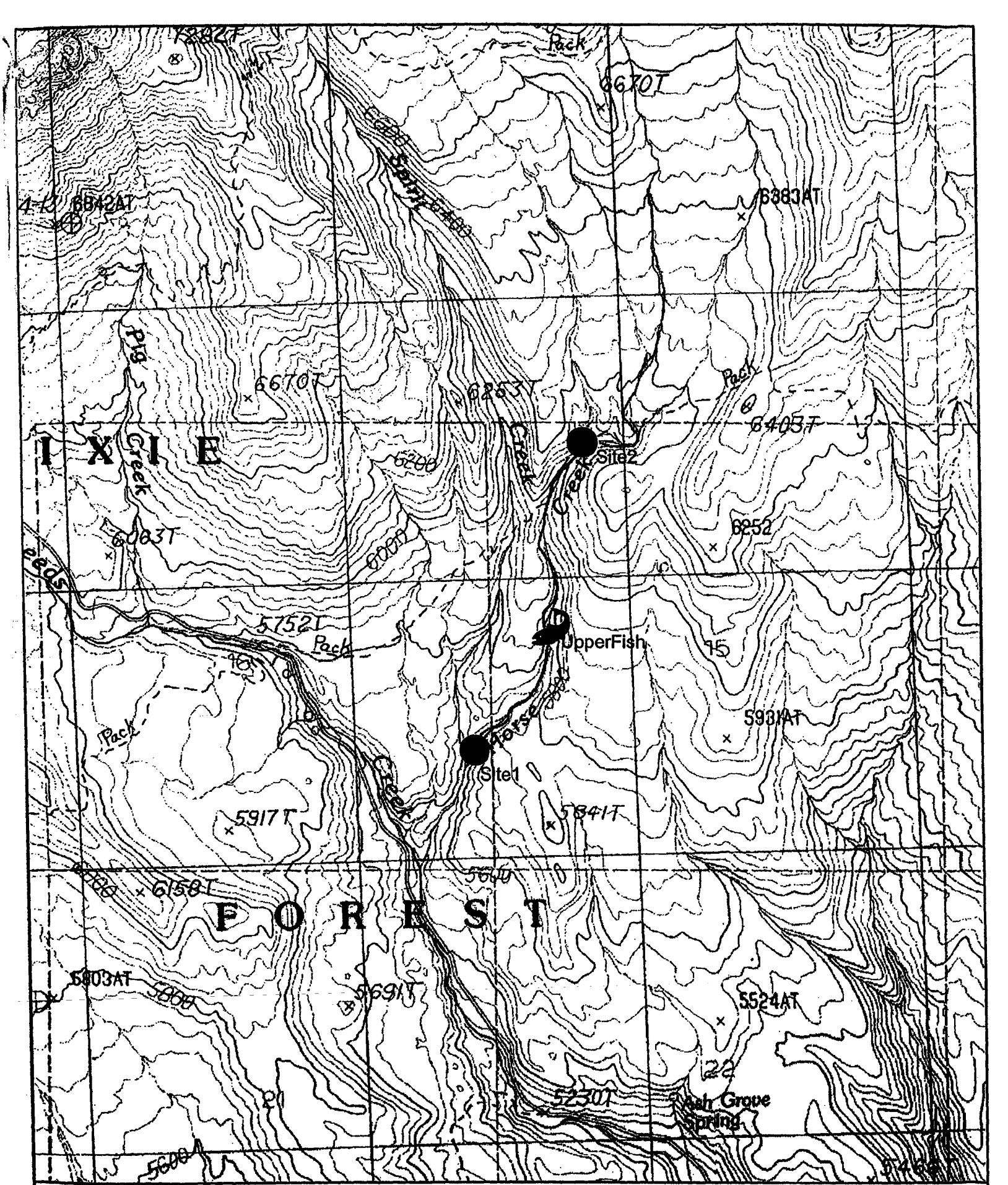
Downstream range of native trout (general description and GPS): Stream ends at confluence with Spirit Creek (see map).

Location (GPS) and description of barriers: Numerous natural upstream migration barriers along stream.
Stream length – Occupied habitat: 0.8 km Available habitat: 0.8 km

3. Survey Site Information (attach map and field survey form) –
Survey method and equipment (gas, battery, settings, block nets, etc): Gasoline backpack electro-shocker.
Survey sites (general description and UTM) :
Site 1: About 0.1 km upstream from confluence with Spirit Creek at: 02854203, 4131352N.
Site 2: Along pack trail (see map) at 0285869E, 4132476N.

Parameter	Site 1	Site 2	Site 3	Site 4
Length of station (meters)	100 m	(no fish sampled)		
Mean *stream* width (meters) (n)	1.0 m			
Station area (hectares)	0.010 ha			
Number of fish 1 4 pass	3 CTBV			
Number of fish 2nd pass	0 CTBV			
Population estimate (95% CI)	3 (± 0)			
Species and mean length (mm) (n)	173 mm (3)			
Species and mean weight (g) (n)	51 g (3)			
Number of fish per km	30 per km			
Number of fish per hectare	300 per ha			
Biomass (kg) per km	1.5 kg per km			
Biomass (kg) per hectare	15.3 kg per ha			

4. Comments – Stream has been impacted by drought. Both numbers and upstream range of CTBV have been restricted in the past two years. Fish were known to occur at Site 2 (see map) as recently as 2000, but found much further downstream in this survey.



Name: SIGNAL PEAK
Date: 1211112002
Scale: 1 inch equals 1379 feet

Location: 12 285543 E 4131912 N
Caption: Horse Ceek, WashInnton County, native cutthroat trout survey. Tributary to Spirit and Leeds creeks.